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THE COLUMBIAN CYCLOPEDIA

THIRTY-TWO VOLUMES

VOL. 2

ANOINT—AUSONIA

WITH ILLUSTRATIONS

BUFFALO, N. Y.
GARRETSON, COX & COMPANY
1897

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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(·) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′ thĕr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, taw.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr, stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′ teh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
ú	full, push, good	*fŭl, pŭsh, gŭd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chār, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′ dĕl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ ĭ, sī′ prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ ŭn.*
th	thing, breath	*thĭng, brĕth.*
th	though, breathe	*thō, brēth.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ ėr, vĭzh′ ŭn.*

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ABBREVIATIONS USED IN THIS WORK.

a., *or* adj....adjective
A.B .....Bachelor of Arts
abbr.....abbreviation, abbreviated
abl. *or* abla.ablative
Abp.....Archbishop
abt .....about
Acad.....Academy
acc. *or* ac..accusative
accom.....accommodated, accommodation
act.....active
A.D.....in the year of our Lord [*Anno Domini*]
Adjt .....Adjutant
Adm .....Admiral
adv. *or* ad..adverb
A. F.....Anglo-French
Ag.....Silver [*Argentum*]
agri.....agriculture
A. L.....Anglo-Latin
Al.....Aluminium
Ala.....Alabama
Alb.....Albanian
alg.....algebra
A.M.....before noon [*ante meridiem*]
A.M. .....Master of Arts
Am.....Amos
Amer.....America, -n
anat.....anatomy, anatomical
anc.....ancient, anciently
AN. M.....in the year of the world [*Anno Mundi*]
anon.....anonymous.
antiq.....antiquity, antiquities
aor.....aorist, -ic
app.....appendix
appar.....apparently
Apr.....April
Ar.....Arabic
arch.....architecture
archæol....archæology
arith.....arithmetic
Ariz.....Arizona
Ark.....Arkansas
art.....article
artil..... artillery
AS.....Anglo-Saxon
As.....Arsenic
Assoc.....Association
asst.....assistant
astrol.....astrology
astron.....astronomy
attrib.....attributive
atty.....attorney
at. wt.....atomic weight
Au.....Gold [*Aurum*]
A.U.C.....in the year of the building of the city (Rome) [*Anno urbis conditæ*]
Aug.....August
aug.....augmentative
Aust.....Austrian
A. V.....authorized version [of Bible, 1611]
avoir.....avoirdupois
B .....Boron
B.....Britannic
b .....born
Ba .....Barium
Bart .....Baronet
Bav .....Bavarian
bl.; bbl....barrel; barrels
B.C .....before Christ
B.C.L.....Bachelor of Civil Law
B.D.....Bachelor of Divinity
bef .....before
Belg.....Belgic
Beng.....Bengali
Bi.....Bismuth
biog.....biography, biographical
biol.....biology
B.L.....Bachelor of Laws
Bohem.....Bohemian
bot.....botany, botanical
Bp .....Bishop
Br.....Bromine
Braz .....Brazilian
Bret.....Breton
Brig.....Brigadier
Brit.....British, Britannica
bro .....brother
Bulg.....Bulgarian
bush.....bushel, bushels
C.....Carbon
c.....century
Ca .....Calcium
Cal.....California
Camb.....Cambridge
Can.....Canada
Cant.....Canterbury
cap .....capital
Capt.....Captain
Card.....Cardinal
carp.....carpentry
Cath.....Catholic
caus.....causative
cav.....cavalry
Cd.....Cadmium
Ce .....Cerium
Celt.....Celtic
cent.....central
cf.....compare [*confer*]
ch *or* chh...church

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Chal.....**Chaldee**
chap.....**chapter**
chem.....**chemistry, chemical**
Chin.....**Chinese**
Chron.....**Chronicles**
chron.....**chronology**
Cl.....**Chlorine**
Class.....**Classical [= Greek and Latin]**
Co.....**Cobalt**
Co.....**Company**
co.....**county**
cog.....**cognate [with]**
Col.....**Colonel**
Col.....**Colossians**
Coll.....**College**
colloq.....**colloquial**
Colo.....**Colorado**
Com.....**Commodore**
com.....**commerce, commercial**
com.....**common**
comp.....**compare**
comp.....**composition, compound**
compar.....**comparative**
conch.....**conchology**
cong.....**congress**
Congl.....**Congregational**
conj.....**conjunction**
Conn *or* **Ct.**.**Connecticut**
contr.....**contraction, contracted**
Cop.....**Coptic**
Cor.....**Corinthians**
Corn.....**Cornish**
corr.....**corresponding**
Cr.....**Chromium**
crystal.....**crystallography**
Cs.....**Cæsium**
ct.....**cent**
Ct. *or* **Conn.**.**Connecticut**
Cu.....**Copper [*Cuprum*]**
cwt.....**a hundred weight**
Cyc.....**Cyclopedia**
D.....**Didymium**
D. *or* **Dut**..**Dutch**
d.....**died**
d. [l. s. d.]..**penny, pence**
Dan.....**Daniel**
Dan.....**Danish**
dat.....**dative**
dau.....**daughter**
D. C......**District of Columbia**
D.C.L......**Doctor of Civil [or Common] Law**
D.D......**Doctor of Divinity**
Dec.....**December**
dec.....**declension**
def.....**definite, definition**
deg.....**degree, degrees**
Del.....**Delaware**
del.....**delegate, delegates**
dem.....**democratic**
dep.....**deputy**
dep.....**deponent**
dept.....**department**
deriv.....**derivation, derivative**
Deut.....**Deuteronomy**
dial.....**dialect, dialectal**
diam.....**diameter**
Dic.....**Dictionary**
diff.....**different, difference**
dim.....**diminutive**
dist.....**district**
distrib.....**distributive**
div.....**division**
doz.....**dozen**
Dr.....**Doctor**
dr.....**dram, drams**
dram.....**dramatic**
Dut. *or* **D**...**Dutch**
dwt.....**pennyweight**
dynam *or* **dyn**.....**dynamics**
E.....**Erbium**
E. *or* **e**.....**East, -ern, -ward**
E. *or* **Eng.**..**English**
Eccl.....**Ecclesiastes**
eccl. *or* **eccles**.....**ecclesiastical [affairs]**
ed.....**edited, edition, editor**
e.g.....**for example [*exgratia*]**
E. Ind. *or* **E. I.**.....**East Indies, East Indian**
elect.....**electricity**
Emp.....**Emperor**
Encyc.....**Encyclopedia**
Eng. *or* **E.**..**English**
engin.....**engineering**
entom.....**entomology**
env. ext.....**envoy extraordinary**
ep.....**epistle**
Eph.....**Ephesians**
Episc.....**Episcopal**
eq. *or* **=**.....**equal, equals**
equiv.....**equivalent**
esp.....**especially**
Est.....**Esther**
estab.....**established**
Esthon.....**Esthonian**
etc.....**and others like [*et cetera*]**
Eth.....**Ethiopic**
ethnog.....**ethnography**
ethnol.....**ethnology**
et seq.....**and the following [*et sequentia*]**
etym.....**etymology**
Eur.....**European**
Ex.....**Exodus**
exclam.....**exclamation**
Ezek.....**Ezekiel**
Ezr.....**Ezra**
F.....**Fluorine**
F. *or* **Fahr.**.**Fahrenheit**
f. *or* **fem**...**feminine**
F. *or* **Fr**....**French**
fa.....**father**
Fahr. *or* **F.**.**Fahrenheit**
far.....**farriery**
Fe.....**Iron [*Ferrum*]**
Feb.....**February**
fem *or* **f.**...**feminine**
fig.....**figure, figuratively**
Fin.....**Finnish**
F.—L......**French from Latin**
Fla.....**Florida**
Flem.....**Flemish**
for.....**foreign**
fort.....**fortification**
Fr. *or* **F.**..**French**
fr.....**from**

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ABBREVIATIONS.

freq.....frequentative
Fris .....Frisian
ft.....foot, feet
fut..... future
G. *or* Ger...German
G.....Glucinium
Ga.....Gallium
Ga.....Georgia
Gael.....Gaelic
Gal .....Galatians
gal.....gallon
galv.....galvanism, galvanic
gard.....gardening
gen.....gender
Gen.....General
Gen .....Genesis
gen..... genitive
Geno.....Genoese
geog .. ...geography
geol.....geology
geom.....geometry
Ger.....German, Germany
Goth.....Gothic
Gov.....Governor
govt.....government
Gr.....Grand, Great
Gr.....Greek
gr.....grain, grains
gram .....grammar
Gr. Brit....Great Britain
Gris.....Grisons
gun .....gunnery
H.....Hegira
H.....Hydrogen
h.....hour, hours
Hab.....Habakkuk
Hag.....Haggai
H. B. M.....His [or Her] Britannic Majesty
Heb.....Hebrew, Hebrews
her.....heraldry
herpet.....herpetology
Hg.....Mercury [*Hydrargyrum*]
hhd..... ..hogshead, hogsheads
Hind.....Hindustani, Hindu, or Hindi
hist.....history, historical
Hon .....Honorable
hort.....horticulture
Hos .....Hosea
Hung.....Hungarian
Hydros.....Hydrostatics
I.....Iodine
I.; Is.....Island ; Islands
Icel.....Icelandic
ichth.....ichthyology
Ida.....Idaho
i.e.....that is [*id est*]
Ill.....Illinois
illus.....illustration
impera *or* impr.....imperative
impers.....impersonal
impf *or* imp.imperfect
impf. p. *or* imp.....imperfect participle
improp.....improperly
In.....Indium
in... .....inch, inches
incept.....inceptive
Ind .....India, Indian
Ind .....Indiana
ind.....indicative
indef .....indefinite
Indo-Eur...Indo-European
inf.....infantry
inf *or* infin.infinitive
instr.....instrument, -al
int... .....interest
intens.....intensive
interj. *or* int.....interjection
interrog....interrogative pronoun
intr. *or* intrans...intransitive
Io... .....Iowa
Ir..... ..Iridium
Ir.....Irish
Iran.....Iranian
irr .....irregular, -ly
Is.....Isaiah
It .....Italian
Jan.....January
Jap.....Japanese
Jas.....James
Jer.....Jeremiah
Jn.....John
Josh.....Joshua
Jr.... .....Junior
Judg .....Judges
K.....Potassium [*Kalium*]
K.....Kings [in Bible]
K.....king
Kan.....Kansas
Kt.....Knight
Ky.....Kentucky
L.....Latin
L.....Lithium
l. [l. s. d.], *or* £..... } pound, pounds [sterling]
La.....Lanthanium
La.....Louisiana
Lam.....Lamentations
Lang.....Languedoc
lang... ....language
Lap.....Lapland
lat .. ..latitude
lb.; llb. *or* lbs..... } pound ; pounds [weight]
Let.....Lettish
Lev . ..... Leviticus
LG.....Low German
L.H.D.....Doctor of Polite Literature
Lieut.....Lieutenant
Lim .....Limousin
Lin .....Linnæus, Linnæan
lit .....literal, -ly
lit .....literature
Lith.....Lithuanian
lithog.....lithograph, -y
LL.....Late Latin, Low Latin
LL.D.....Doctor of Laws
long.....longitude
Luth.....Lutheran
M.....Middle
M.. .....Monsieur
m.....mile, miles
m. *or* masc..masculine
M.A.....Master of Arts
Macc. . ....Maccabees
mach... ....machinery
Mag.....Magazine

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ABBREVIATIONS.

Maj.....Major
Mal.....Malachi
Mal.....Malay, Malayan
manuf.....manufacturing, manufacturers
Mar.....March
masc *or* m.masculine
Mass.....Massachusetts
math. .....mathematics, mathematical
Matt.....Matthew
M.D..... ...Doctor of Medicine
MD.....Middle Dutch
Md.....Maryland
ME.....Middle English, or Old English
Me.....Maine
mech.....mechanics, mechanical
med.....medicine, medical
mem.....member
mensur....mensuration
Messrs. *or* MM.....Gentlemen, Sirs
metal.....metallurgy
metaph....metaphysics, metaphysical
meteor.....meteorology
Meth.....Methodist
Mex.....Mexican
Mg.....Magnesium
M.Gr.....Middle Greek
MHG.....Middle High German
Mic..... ..Micah
Mich .....Michigan
mid.....middle [voice]
Milan.....Milanese
mid. L. *or* ML..... } Middle Latin, Mediæval Latin
milit. *or* mil.... ..military [affairs]
min .....minute, minutes
mineral....mineralogy
Minn.....Minnesota
Min. Plen..Minister Plenipotentiary
Miss.....Mississippi
ML. *or* mid. L... } Middle Latin, Mediæval Latin
MLG.....Middle Low German.
Mlle.....Mademoiselle
Mme.....Madam
Mn.....Manganese
Mo.....Missouri
Mo.....Molybdenum
mod.....modern
Mont.....Montana
Mr.....Master [Mister]
Mrs..... .Mistress [Missis]
MS.; MSS..manuscript; manuscripts
Mt.....Mount, mountain
mus.....music
MUS.DOC....Doctor of Music
myth.....mythology, mythological
N.....Nitrogen
N. *or* n.....North, -ern, -ward
n .....noun
n *or* neut...neuter
Na .....Sodium [*Natrium*]
Nah.....Nahum
N. A., *or* N. Amer.North America, -n
nat.....natural
naut.....nautical
nav.....navigation, naval affairs
Nb.....Niobium
N. C. *or* N. Car...North Carolina
N. D.....North Dakota
Neb.....Nebraska
neg.....negative
Neh.....Nehemiah
N. Eng.....New England
neut *or* n...neuter
Nev.....Nevada
N.Gr.....New Greek, Modern Greek
N. H .....New Hampshire
NHG.....New High German [German]
Ni.... .....Nickel
N. J.....New Jersey
NL .....New Latin, Modern Latin
N. Mex.....New Mexico
N. T.. *or* N. Test...New Testament
N. Y.....New York [State]
nom.....nominative
Norm. F...Norman French
North. E ..Northern English
Norw... ...Norwegian, Norse
Nov.....November
Num.....Numbers
numis.....numismatics
O.....Ohio
O.....Old
O.....Oxygen
Obad.....Obadiah
obj.....objective
obs. *or* †...obsolete
obsoles ....obsolescent
O.Bulg.....Old Bulgarian or Old Slavic
Oct.....October
Odontog...odontography
OE.....Old English
OF *or* O. Fr....Old French
OHG.....Old High German
Ont.....Ontario
opt .. ..optics, optical
Or.....Oregon
ord .....order
ord.... ....ordnance
org.....organic
orig.....original, -ly
ornith.....ornithology
Os .....Osmium
OS. ... .Old Saxon
O. T., *or* O. Test...Old Testament
Oxf.....Oxford
oz.....ounce, ounces
P.....Phosphorus
p.; pp.....page; pages
p., *or* part..participle
Pa. *or* Penn.Pennsylvania
paint .....painting
paleon.....paleontology
parl.....parliament
pass.....passive

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pathol *or* path.....pathology
Pb.....Lead [*Plumbum*]
Pd .....Palladium
Penn *or* Pa.Pennsylvania
perf .....perfect
perh .....perhaps
Pers.....Persian, Persic
pers.....person
persp.....perspective
pert.....pertaining [to]
Pet..... .Peter
Pg. *or* Port.Portuguese
phar.....pharmacy
PH.D .....Doctor of Philosophy
Phen.....Phenician
Phil.....Philippians
Philem.....Philemon
philol. ....philology, philological
philos. *or* phil... } philosophy, philosophical
phonog.....phonography
photog.....photography
phren.....phrenology
phys.....physics, physical
physiol... .physiology, physiological
Pied .....Piedmontese
Pl ....Plate
pl. *or* plu...plural
Pl. D.....Platt Deutsch
plupf.....pluperfect
P.M.....afternoon [*post meridiem*]
pneum.....pneumatics
P. O.....Post-office
poet.....poetical
Pol.....Polish
pol econ...political economy
polit.....politics, political
pop... ....population
Port. *or* Pg.Portuguese
poss .....possessive
pp.....pages
pp.....past participle, perfect participle
p. pr.....present participle
Pr. *or* Prov.Provençal
pref.....prefix
prep.....preposition
Pres.....President
pres .....present
Presb.....Presbyterian
pret.....preterit
prim.....primitive
priv.....privative
prob.....probably, probable
Prof .....Professor
pron.....pronoun
pron.....pronunciation, pronounced
prop.....properly
pros.....prosody
Prot.. .....Protestant
Prov.*or* Pr.Provençal
Prov.....Proverbs
prov.....province, provincial
Prov. Eng..Provincial English
Prus.....Prussia, -n
Ps.....Psalm, Psalms
psychol....psychology

pt.....past tense
pt.....pint
Pt.....Platinum
pub.....published, publisher, publication
pwt.....pennyweight
Q.....Quebec
qt.....quart
qtr..... ...quarter [weight]
qu.....query
q.v.....which see [*quod vide*]
R.....Rhodium
R .....River
Rb. .....Rubidium
R. Cath....Roman Catholic
rec. sec.....recording secretary
Ref.....Reformed
refl.....reflex
reg.....regular, -ly
regt.....regiment
rel. pro. *or* rel.....relative pronoun
repr .....representing
repub.....republican
Rev .. ....Revelation
Rev.....The Reverend
Rev. V.....Revised Version
rhet.....rhetoric, -al
R. I.....Rhode Island
R. N.....Royal Navy
Rom .....Roman, Romans
Rom.....Romanic or Romance
Rom. Cath. Ch. *or* R. C. Ch.... } Roman Catholic Church
r.r.....railroad
Rt. Rev ...Right Reverend
Ru .....Ruthenium
Russ.....Russian
r.w.....railway
S.....Saxon
S.....Sulphur
s.....second, seconds
s. [l. s. d.]..shilling, shillings
S. *or* s.....South, -ern, -ward
S. A. *or* S. Amer..South America, -n
Sam .....Samaritan
Sam.....Samuel
Sans, *or* Skr.....Sanskrit
Sb.....Antimony [*Stibium*]
s.c.....understand, supply, namely [*scilicet*]
S. C. *or* S. Car....South Carolina
Scand.....Scandinavian
Scot.....Scotland, Scotch
scr.....scruple, scruples
Scrip.....Scripture [s], Scriptural
sculp.....sculpture
S. D.....South Dakota
Se.....Selenium
sec.... ....secretary
sec.....section
Sem.....Semitic
Sep .....September
Serv.....Servian
Shaks..... Shakespeare
Si.....Silicon

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Sic.....Sicilian
sing.....singular
sis.....sister
Skr. *or* Sans.....Sanskirt
Slav.....Slavonic, Slavic
Sn.....Tin [*Stannum*]
Soc.....Society
Song Sol...Song of Solomon
Sp.....Spanish
sp. gr.....specific gravity
sq.....square
Sr.....Senior
Sr.....Strontium
St.; Ste....Saint
St.....street
stat.....statute
S.T.D.....Doctor of Sacred Theology
subj.....subjunctive
suf.....suffix
Su. Goth...Suo-Gothic
superl.....superlative
Supp.....Supplement
Supt.....Superintendent
surg.....surgery, surgical
Surv.....surveying
Sw.....Swedish
Swab.....Swabian
sym.....symbol
syn.....synonym, -y
Syr.....Syriac, Syrian
t.....town
Ta.....Tantalum
Tart.....Tartar
Te.....Tellurium
technol...technology
teleg.....telegraphy
Tenn.....Tennessee
term.....termination
terr.....territory
Teut.....Teutonic
Tex.....Texas
Th.....Thorium
theat.....theatrical
theol.....theology, theological
therap.....therapeutics
Thess.....Thessalonians
Ti.....Titanium
Tim.....Timothy
Tit.....Titus
Tl.....Thallium
toxicol.....toxicology
tp.....township
tr. *or* trans.transitive
transl.....translation, translated
trigon.....trigonometry
Turk.....Turkish
typog.....typography, typographical
U.....Uranium
ult.....ultimate, -ly
Unit.....Unitarian
Univ.....Universalist
Univ.....University
U. Presb...United Presbyterian
U. S.....United States
U. S. A.....United States Army
U. S. N.....United States Navy
Ut.....Utah
V.....Vanadium
v.....verb
Va.....Virginia
var.....variant [word]
var.....variety of [species]
Ven.....Venerable
Venet.....Venetian
vet.....veterinary
v. i. *or* v. intr....verb intransitive
vil.....village
viz.....namely, to-wit [*videlicet*]
v. n.....verb neuter
voc.....vocative
vol.....volume
vols.....volunteers
Vt.....Vermont
v. tr.....verb transitive
W.....Tungsten [*Wolfram*]
W.....Welsh
W. *or* w....West, -ern, -ward
Wal.....Walachian
Wall.....Walloon
Wash.....Washington
Westph.....Westphalia, -n
W. Ind. *or* W. I.....West Indies, West Indian
Wis.....Wisconsin
wt.....weight
W. Va.....West Virginia
Wyo.....Wyoming
Y.....Yttrium
yd.....yard
yr.....year
Zech.....Zechariah
Zeph.....Zephaniah
Zn.....Zinc
zool.....zoology, zoological
Zr.....Zirconium

See also ABBREVIATIONS in Vol. I.

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THE

COLUMBIAN CYCLOPEDIA.

ANOINT, v. *ă-noynt'* [Norm. F. *enoindre*, to anoint; *enoint*, anointing—from L. *in*, in; *ungo*, I anoint]: to rub or smear with oil; to consecrate. ANOINT'ER, one who. ANOINT'ED, pp.: N. the Messiah: ADJ. consecrated. ANOINT'ING, imp.: N. the act of smearing with oil: ADJ. rubbing with oil. ANOINT'MENT, n. the act of anointing.

ANOINT'ING: ceremony of pouring an aromatic oil on the head or over the whole body, practiced from the earliest times among oriental nations, and probably first used as a sanative agent in conjunction with the bath. From its observance for the promotion of health and comfort, it gradually came to be esteemed as a token of honor to guests and strangers, and subsequently was adopted as a symbol of consecration. See CHRISM: CORONATION: EXTREME UNCTION.

ANOMALA, n. plu. *ă-nŏm'ă-lă* [see ANOMALY]: irregular words, etc.

ANOMALISTIC YEAR, *ă-nŏm'ă-lĭs'tĭk:* interval that elapses between two successive passages of the earth through its perihelion, or point of nearest approach to the sun. If the earth's orbit had a fixed position in space, this period would correspond with that of a sidereal revolution, or the time the earth takes after leaving any point of the heavens to return to it again; but the disturbing influence of the other planets causes the perihelion to advance slowly (11·8″ annually) in the direction of the earth's motion; so that the A. Y. is longer (4 minutes 39 seconds) than the sidereal. The length of the A. Y. is 365 days, 6 hours, 13 minutes, 49 seconds. It receives its name from the anomaly (q.v.).

ANOMALY, n. *ă-nŏm'ă-lĭ*, ANOM'ALIES, n. plu. *-ă-lĭz*, [Gr. *anom'ălos*, rough, uneven—from *an*, not; *(h)omàlos*, like to, or similar]: a departure from the common rule; irregularity. ANOM'ALOUS, a. *-lŭs*, out of rule; irregular. ANOM'ALOUSLY, ad. *-lĭ*. ANOMALISTIC, a. *ă-nŏm'ă-lĭs'tĭk*, irregular; departing from common or established rules; also ANOM'ALIS'TICAL, a. *-tĭ-kăl*. ANOM'ALIST, n. one who.

ANOMALY, in Astronomy: the angle measured at the sun between a planet in any point of its orbit and the last perihelion. It is so called because it was in it that the first irregularities of planetary motion were dis-

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covered. The anomaly was formerly measured from the aphelion, the opposite point of the ellipse; but from the fact that the aphelia of most of the comets lie beyond the range of observation, the perihelion is now taken as the point of departure for all planetary bodies.

ANOMODONTIA, n. plu. *ăn'ō-mō-dŏn'shĭ-ă* [Gr. *an'ŏmŏs*, irregular; *odonta*, a tooth]: in *geol.*, an order of reptiles, also called DICYNODONTIA.

ANOMOPTERIS, n. *ăn'ō-mŏp'tĕr-ĭs* [Gr. *an'ŏmos*, without rule; *pteris*, fern]: fossil ferns, differing from all recent ones, having the leaves very large and deeply pinnate.

ANOMOURA or ANOMURA. n. *ăn'ō mō'ră* [Gr. *an'ŏmos*, irregular, without rule; *oura*, a tail]: a family of crustaceans characterized by the irregular development of their abdominal segments, as the hermit-crab. AN'OMOU'RAL, a. pertaining to.

ANON, ad. *ă-nŏn'* [AS. *on an*, in one]: in *OE.*, soon; quickly.

ANONA: see CUSTARD-APPLE.

ANONACEÆ, *ăn-ŏ-nā'sē-ē:* natural order of Dicotyledonous or Exogenous plants, of which the type is the genus *Anona*. They are trees or shrubs, with alternate, simple, generally entire leaves, destitute of stipules; flowers usually green or brown, axillary, solitary, or two or three together; the calyx of 3–4 persistent sepals; the corolla of 6 hypogynous leathery petals, in two rows. The stamens are usually numerous; the filaments short; the anthers adherent, turned outwards, and with a large 4-cornered *connective*. See STAMEN. The carpels are usually numerous, separate, or cohering; the styles short; the stigmas simple; the ovules inverted. The fruit consists of distinct or united carpels, sometimes succulent; the seeds attached to the suture; their external covering brittle; the embryo minute, in the base of the hard albumen.—There are about 300 known species, mostly natives of tropical countries. They are generally aromatic and fragrant in all their parts, and some species are employed medicinally; the dry fruit of *Xylopia aromatica* is commonly used as pepper by the African negroes, and was formerly imported into Europe as ETHIOPIAN PEPPER or GUINEA PEPPER. The flowers of some species are of exquisite fragrance; others yield delicious fruits. See CUSTARD-APPLE: CHERIMOYER.

ANONYMOUS, a. *ă-nŏn'ĭ-mŭs* [L. *anon'ymus*, without a name—from Gr. *a*, without; *onŏma*, a name: F. *anonyme*]: having no name; without the name of the author or writer. ANON'YMOUSLY, ad. *-lĭ*. ANON'YMOUSNESS, n. the state or quality of being anonymous. ANONYMITY, n. *ăn'ŏn-ĭm'ĭ-tĭ*, the state of being without the name of the author or writer; the quality or state of being anonymous.

ANONYMOUS: without the name of the author—applied to a book or writing: when an assumed name is given, the term PSEUDONYMOUS is used. Works of this class constitute one of the great difficulties of bibliography. French literature possesses an excellent *Dictionnaire des Ouvrages*

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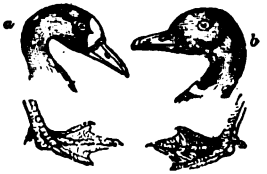
PLATE 1.

Anona or Sour-sop (*Anona muricata*).



Characters of **Anseridæ** : *a*, White-fronted Goose (*Anser erythropus*); *b*, The Tame Goose (*Anser domesticus*).

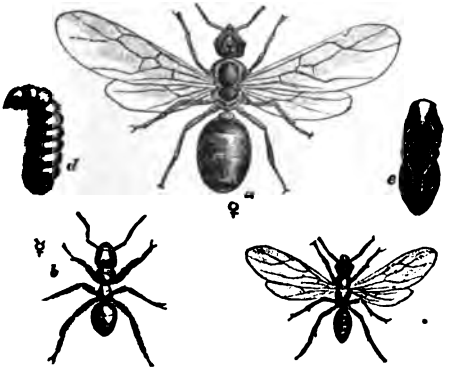


Fig. 1.—A Common **Ant** (*Lasius flavus*): *a*, Queen; *b*, Worker; *c*, Male; *d*, Larva; *e*, Pupa. (After Lubbock.)

Fig. 2.—Part of a Gallery, with **Ant** working on tip-toe: *Pogonomyrmex molifaciens*, the Agricultural Ant of Texas. (From M'Cook.)

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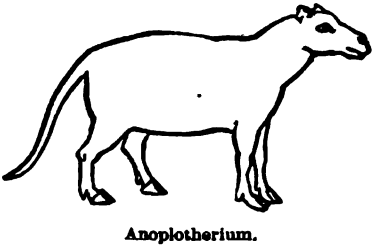
Anonymes et Pseudonymes (3d ed., 4 vols., Par. 1872–79) by Barbier, embracing the titles of about 24,000 works, with the names of those who are known or assumed to be the authors. Other lists of A. and pseudonymous literature are found in the indexes to *Notes and Queries;* in 'Olphar Hamst's' *Handbook of Fictitious Names* (1868); Cushing's *Initials and Pseudonyms* (N. Y., 1885), with its companion vol., *Anonyms*, comprising the titles of 20,000 books and pamphlets and authors' names; and Halkett and Laing's *Dictionary of A. and Pseudonymous Literature* (4 vols., Edinburgh 1881–87). It is generally admitted that anonymity secures the independence of the critic; but also it is often a shield to a coward. An instance of the benefit of anonymity (or pseudonymity) was seen in the results of an article in the *Forum* (New York 1887), by 'J. Clay Adams.' An intolerable abuse is the A. letter.

ANOPLOTHERIUM, n. *ăn'ō-plō-thē'rĭ-ŭm* [Gr. *a*, without; *(h)oplon*, a weapon; *thērion*, a wild beast]: genus of extinct ungulates, between swine and ruminants, destitute of organs of defense, as tusks, claws, or horns; established by Cuvier from bones occurring in great abundance in the gypsum strata of the Upper Eocene (q.v.) formation, near Paris. They are found also in the same formation in the Isle of Wight, and elsewhere. The teeth differ from those of all other Pachydermata, extinct or recent. There are six incisors, two canines, eight premolars, and six molars in each jaw—the dental formula thus agreeing with that of the fossil genus *Palæotherium* (q.v.); but the teeth are arranged in a continuous series without intervening vacancies—a circumstance very remarkable, as it does not occur in any existing quadruped, but now appears in man alone. The molars of the upper jaw are quadrangular, those of the lower marked with a double or triple crescent of enamel, which forms prominent ridges. In some respects, the teeth resemble those of the *Ruminantia* (q.v.), or ruminating quadrupeds, between which and the *Suida* group the A. has been thought to form a connecting link; but in



Anoplotherium.

some of the species originally included in this genus, and which are now sometimes ranked along with it under the name *Anoplotheroids*, the teeth exhibit peculiarities which have led to the supposition that their food may not have been exclusively vegetable. The snout is not much elon-

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gated, and it is evident that there was no proboscis. The feet are terminated by two toes, as in the Ruminantia; but they have always separate metacarpal and metatarsal bones, not a single *canon* bone. A considerable number of species of A. and of Anoplotheroids have been determined, differing in size from that of a small ass to that of a hare, or even of a guinea-pig; so that the smallest species must have been smaller than any hoofed quadruped now existing, or any known to have ever existed. They differ also considerably in general appearance, some having had comparatively long limbs and a light and graceful form, while some were firmly built and heavy. Their habits may be supposed to have differed accordingly. The true Anoplotheria were probably very similar in habits to tapirs. The powerful flattened tails of some are supposed to indicate an adaptation for aquatic life; others have smaller supplemental toes, besides the two hoofs. They form the genera *Dichodon*, *Dichobuné*, *Xiphodon*, and *Microtherium*.

ANOPLURA, n. plu. *ăn'ō-plō'rā* [Gr. *anoplos*, unarmed; *oura*, a tail]: name given by Leach to an order of insects called Parasita (q.v.) by Latreille, Cuvier, etc.—part of the *Aptera* of Linnæus—of which the type is the genus *Pediculus* or Louse (q.v.); now ranked under Hemiptera.

ANOPSIA, n. *ăn-ŏp'sĭ-a*, or ANOPSY [Gr. *an*, priv.; *opis*, sight]: deprivation of sight; sightlessness. In *pathol.*, [Gr. *ana*, upward], upward strabismus; upward squint.

ANOREXIA, n. *ăn'ō rĕks'ĭ-ā* [Gr. *an*, without; *orex'is*, a longing for, eager desire]: want of appetite; also ANOREXY, n. *ăn'ō rĕks-ĭ*.

ANOSMIA, n. *ăn-ŏs'mĭ a* [Gr. *an*, priv.; *osme*, smell]: in *pathol.*, state of being deprived of the sense of smell. The synonyms of A. used by medical writers are numerous; e.g., anosmosia, anosphrasia, anosphresia, parosmia, anæsthesia olfactoria, anodmia, etc.

ANORTHITE, n. *ā-nŏr'thīt* [Gr. *a*, without; *orthos*, upright]: one of the felspar family whose cleavages are without right angles. ANOR'THIC, a. *-thĭk*, pertaining to.

ANOTHER, a. *ă-nŭth'ĕr* [*one* and *other*]: one; not the same; any one else.

ANOURA, n. *ă-nō'rā* [Gr. *a*, without; *oura*, a tail]: a class of amphibians without tails, as the frog, toad, etc. ANOU'ROUS, a. *-rŭs*, destitute of a tail.

ANQUETIL-DUPERRON, *ŏnk-tēl'-dü-pĕr-rōn'*, ABRAHAM HYACINTHE: 1731, Dec. 1—1805, Jan. 17; b. Paris: oriental scholar. He studied theology, but was attracted to oriental studies, and to gratify his passion for learning, he enlisted as a private soldier for India 1754; but was rescued by friends and enabled, through the royal munificence, to proceed independently. He fixed his residence at Surat, where there was a colony of Parsees, or fire-worshippers, with whose priests he became intimate; and 1762 he returned to Europe, having collected 100 valuable MSS., with other curiosities. The Abbé Barthélemy obtained for him a situation in the Bibliothèque Royale. In 1771 he pub-

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lished his *Zend-avesta*, 3 vols., a literal translation of the *Vendidad*, and other sacred books of the Parsees. This work made an epoch in European knowledge of the doctrines of the ancient Persians, previously drawn from Greek and Roman sources, hostile Mohammedans, and later eastern nations. Unfortunately, A.'s zeal surpassed his patience, sagacity, and mastery of the languages which he translated; and his labors are now largely superseded. Among his works are *Législation Orientale*, 1778; *Recherches Historiques et Géographiques sur l'Inde*, 1786; *Oupnek'hat* (Latin translation of a Persian version of the chief Indian *Upanishads*) 1804.

ANSARIANS, or ANSARIES, or ANSARS. see NOSSAIRIANS.

ANSBACH: see ANSPACH.

ANSCHUTZ, *ân'shûts*, KARL: musician 1813, Feb.—1870, Dec. 30. He conducted orchestras in many European cities; and settled in New York 1857, where he successfully organized German opera. He died in New York.

ANSE, *âns:* a name sometimes given to the handles of a cannon. These handles, especially in some foreign cannon, are cast in the forms of dolphins or serpents.

ANSE DE PANIER, *ângs deh pâ nyā':* term used in French architecture, designating a particular form of bridge arches; basket-handle shaped.

ANSELM, *ân'sèlm*, of Canterbury: 1033–1109, Apr. 21; b. Aosta, Piedmont: scholastic philosopher. He led at first a dissipated life; and, like Abelard, wandered through France, after the fashion of the scholars of those days, disputing wherever he could find an adversary. Attracted by the reputation of Lanfranc, he went, 1060, to study at the monastery of Bec, in Normandy. Three years afterwards, he became prior, and in 1078, abbot of this monastery, the most famous school of the 11th c. Lanfranc, who in the mean time had gone to England, and become Abp. of Canterbury, died 1089; and the diocese remained four years without a successor, till, 1093, A. was appointed. He was distinguished both as a churchman and a philosopher. His numerous embroilments with William Rufus and Henry I., and the unbending spirit which he displayed in these, even when subjected to banishment, indicate the vigor and resoluteness of his character, as much as his writings exhibit the depth and acuteness of his intellect. In 1720, Clement XI. expressly placed him in the list of church authorities. A. was a second Augustine, superior to all his contemporaries in sagacity and dialectical skill, and equal to the most eminent in virtue and piety. Embracing, without question, the doctrines of the church, mostly as stated by Augustine, and holding that belief must precede knowledge, and must be implicit and undoubting; he yet felt the necessity of a religious philosophy, urged the duty of proceeding from belief to knowledge, and sought to reduce the truths of religion into the form of a connected series of reasonings. It was for this purpose he wrote his *Monologium*

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sive Exemplum Meditandi de Ratione Fidei. In his *Proslogium,* otherwise entitled *Fides quærens Intellectum* (Faith Seeking Intellect), he strove to demonstrate the existence of God from the conception of a perfect being. This ontological proof, however, has never been held satisfactory, though of late there is some indication of a tendency to return to its general line. It is usually considered as assuming at the start the Divine existence which it seeks to prove, or as arguing that because the mind has certain conceptions there exist the realities corresponding. His writings, *Cur Deus Homo* and *De Concordiâ Præscientiæ et Prædestinationis,* made an epoch in Christian philosophy. A. may justly be reckoned the earliest of the schoolmen, although Alexander of Hales (q.v.) was the first who completely systematized in the scholastic manner the doctrines of the Catholic Church. A. was buried at Canterbury. The day of his death is observed in the Rom. Cath. Church. See Rémusat's *Anselme* (1858) and Church's *A.* (1870).

ANSER: see ANAS: GOOSE.

ANSERINE, a. *ăn'sĕr-īn* [L. *anser,* a goose]: of the goose tribe; uneven.

ANS'GAR, or ANSCHARIUS, *an-skā'rĭ-us:* abt. 801–864, Feb. 3; b. Picardy: styled the Apostle of the North, on account of his labors to introduce Christianity into Denmark, Sweden, and Northern Germany. Under the patronage of Louis le Débonnaire, he went, with his colleague Audibert, to preach Christianity among the heathen Northmen of Schleswig, where he suffered many persecutions; but had nevertheless such success that, in 832, the pope established an archbishopric in Hamburg, and A. was appointed the first abp. Here he passed through many difficulties, having to save his life by flight in 845, when the Northmen and Danes under Eric I. plundered Hamburg. He afterwards made several missionary tours in Denmark and Sweden, and d. at Bremen, where a church was named after him. The Rom. Cath. Church has canonized him.

ANSON, *ăn'son,* GEORGE, LORD, Admiral: 1697, Apr. 23—1762, June 6; b. Shugborough, Staffordshire. He early showed predilection for a sea-life. In 1716, he served as second lieut. under Norris; next under Byng in 1718, against the Spaniards; and was made capt. 1723. In 1739, when war with Spain broke out, he was recalled from the Carolina station, on which he had been since 1724, and received the command of the fleet in the South Sea, with instructions to inflict whatever injury he could on the Spanish commerce and colonies, and sailed from England in Sept., 1740. After many misfortunes, he captured several prizes, including a Spanish galleon with a $2,000,000 cargo. He returned to England 1744, June 15, having circumnavigated the globe in 3 years, 9 months, and greatly extended the knowledge of navigation and geography. He was promoted rear-admiral of the blue 1744, first lord of the admiralty 1751, and admiral of the fleet 1761, and for his victory over the French at Cape Finisterre was created Baron of Soberton.

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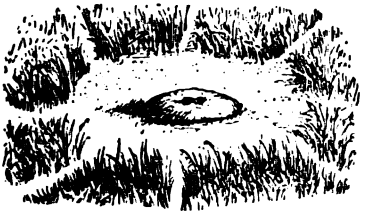
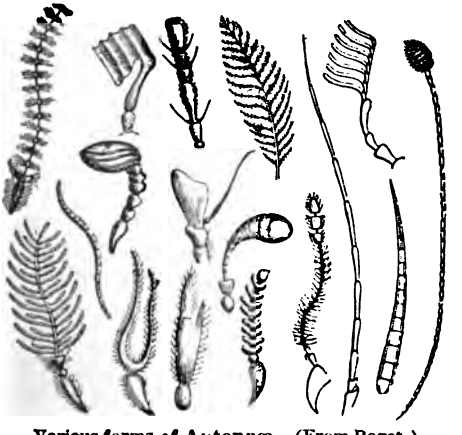
PLATE 2.



Ant's Nest (a mound disk) with roads: *Pogonomyrmex molifaciens*, the Agricultural Ant of Texas. (From M'Cook.)

Honey Ant (*Myrmecocystus Mexicanus*): *a*, natural size. (From Rev. W. Farren White.)



Various forms of Antennæ. (From Roget.)

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ANSO'NIA: town in New Haven co., Conn.; on the Naugatuck river, the Naugatuck division of the New York New Haven and Hartford railroad, and the New Haven and Derby branch of the Housatonic railroad; 9 m. w. of New Haven, 14 m. n.e. of Bridgeport. There are 5 churches; a high school; a free public library, opened June 1892; one daily and one weekly newspaper; a national bank (cap. $200,000) and a savings bank; and 3 hotels. There are abundant water supply from the adjacent hills; 2 organized fire-companies, called by electric alarms; an electric street railroad to Derby and Birmingham (the first successful one in New England); and a widely extended system of electric clocks. The fine water-power of the Naugatuck river has been extensively utilized, and beside some of the largest brass and clock works in the country, there are manufactures of machinery, iron, copper, woolen, and electrical goods, and the works of the Postal Telegraph Company. The electric light was introduced at an early period, and experiments conducted here have been very useful in promoting its development. A. was settled about 1845; separated from Derby, and incorporated 1889; and had valuation (1890) $1,914,099; and debt (1892) $175,000. Pop. (1880) 3,855; (1894) 14,258.

ANSPACH, *ăns'păk*, or, more properly, **ANSBACH**: town of Bavaria, cap. of the circle of Middle Franconia (*Mittel-Franken*); on the Rezat, 25 m. s.w. from Nürnberg. It has manufactures of cotton and half-silken fabrics, tobacco, earthenware, playing-cards, cutlery, and white lead; also a considerable trade in wool, flax, and corn. The situation is pleasant, but there are no remarkable buildings, except the deserted palace of the former margraves of A., surrounded by gardens, and the church of St. Gunibert, said to occupy the site of a church erected in the 8th c., around which the town grew. Pop. (1880) 14,195.

ANSTRUTHER, *ăn'strū-thĕr* or *ăn'stĕr* (**EASTER** and **WESTER**): royal burghs of Fifeshire, Scotland, 9 m. s. of St. Andrews. Pop. of both (1881) 1,842.

ANSWER, v. *ăn'sĕr* [AS. *andswarian*—from *and*, against, and *swerian;* Goth. *svaran*, to swear: Icel. *svara*, to answer]: to speak in return; to reply; to be accountable for; to suit; to satisfy, as a claim or a right; to correspond with; to meet or confront: N. something said in reply to a question; correspondence with; retaliation. **AN'SWERING**, imp. **ANSWERED**, pp. *ăn'sĕrd*. **AN'SWERER**, n. one who. **ANSWERABLE**, a. *ăn'sĕr-ă-bl*, what may be replied to; accountable; responsible; suitable. **AN'SWERABLY**, ad. *-bli*. **AN'SWERABLENESS**, n. *-bl-nĕs*, the quality of being answerable. **AN'SWERLESS**, a. without an answer; that cannot be answered.—**SYN.** of 'answer, n.': reply; response; rejoinder;—of 'answerable': responsible; accountable; amenable.

ANT, *ănt*, or **ANTI**, *ăn'tī* [Gr.]: a prefix meaning, against; opposite.

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ANT, n. *ănt* [AS. *æmet*]: a small insect; an emmet—of which it is a contracted form. ANT-HILL, a nest of ants. ANT-EATER, a quadruped, having a long snout or muzzle and long tongue, which feeds upon ants. ANT-LION, a small neuropterous insect which preys upon ants.

ANT (*Formĭca*): Linnæan genus of Hymenopterous insects, now divided into several genera, which form a family called *Formicidæ*. The English name is contracted from *Emmet*, still also occasionally used. Another old English name, not now in frequent use, is *Pismire*. The species are numerous, and are generally distributed over temperate and tropical regions. Their habits and instincts are extremely interesting, and have attracted attention from remote ages.

Ants are small insects, but of extraordinary muscular strength. They carry loads of ten or twelve times their own weight, and have great activity. They have a triangular head; the antennæ are geniculate; the jaws strong; the ligula or lower lip small, rounded, vaulted or spoon-like; the thorax compressed at the sides; the abdomen nearly oval, the pedicle which joins it to the thorax forming in some kinds a single, and in some, a double scale or knot. They live in societies, often very large, which consist, as in bees, of *males*, *females*, and *neuters*. The neuters are females with imperfect ovaries, transformed at an early stage of their existence, and are distinguished into two classes, *workers* and *soldiers*, the former constituting the greater portion of each society, the latter somewhat differing from them in larger size, and larger and more powerful head. The ordinary work of the society is performed by the workers: the principal part in warfare, defensive or offensive, is taken by the soldiers. The males and females constitute but a small portion of each community. They have delicate glistening wings; but the neuters have no wings, and the thorax is smaller and more compressed. The males are smaller than the females, and the workers are rather smaller than the males. The females and neuters of some kinds (genera *Ponera*, *Myrmica*, *Atta*, and *Cryptocerus*) are armed with stings; other kinds (*Formica* and *Polyergus*) have no sting, but have the power of ejecting a peculiar volatile acid, FORMIC ACID (q.v.), from a small sac in the abdomen; by this means effectually repelling many adversaries, to which the pungent fumes are intolerable. Small animals are soon killed by the vapor of an ant hill; and a dog has been known to retire yelling from the effect upon his eyes, either of the vapor, or a discharge of the fluid itself. It is said, that when those ants that are unprovided with a sting make use of their mandibles to inflict a bite, they curve

Atta barbara:
A, one of the larger workers; B, one of the smaller workers; C, a male; D, a female—all natural size.

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round their abdomen, so as to be ready immediately to squirt this acid into the wound.

The winged ants appear mostly in autumn, and perish before the commencement of the cold weather; a few surviving to found new colonies and perpetuate the race. The neuters pass the winter in large numbers in a torpid state, and resume activity on the return of spring. The nests of ants, after midsummer, are usually found to contain winged males and females mixed with the wingless neuters, which, however, restrain them, and particularly the females, from making their escape into the air, until the pairing season, when they ascend into it in immense swarms, those from many ant-hills sometimes uniting their myriads, rising with incredible velocity in distant columns, and soaring to a great height. 'Each column looks like a kind of slender net-work, and has a tremulous undulating motion. The noise emitted by myriads and myriads of these creatures does not exceed the hum of a single wasp. The slightest zephyr disperses them.' They occasionally, however, make their appearance in such prodigious numbers, that the air is obscured by them. The pairing of ants is supposed to take place in the air. Some of the females which escape destruction by their enemies, or by the elements, found new colonies, in which at first they perform the work usually assigned to neuters. Some, however, are seized by the neuters of ant-hills near which they fall, and there is even reason to think that these go out to search for them; they are stripped of their wings, and forcibly conducted to the habitation, the number of whose inhabitants is to be increased by their multitudinous progeny. They are fed and treated with apparent respect, like the queen-bee among bees; but a society of ants, unlike one of bees, often contains numerous females, each thus treated and equally employed in the important work of laying eggs. Unlike the queen-bees, also, they are invariably denuded of their wings; nor is this always done by the neuters, to prevent their escape, but the female ant, after fecundation, has been seen to denude herself of her own wings, as now superfluous appendages.

The eggs of ants are so small as to be scarcely visible to the naked eye. The mother drops them at random in her progress through the nest; but the workers, of whom some are always in attendance on her, immediately seize them, moisten them with their tongues, and lay them in heaps in particular apartments of the nest. They continue to watch them, and to remove them from one quarter of the nest to another, apparently in order that they may always enjoy a suitable temperature, and perhaps in order to avoid any excess of moisture. In a few days, the young larvæ are produced; and these require the unremitting care of the workers, which feed them, disgorging into their mouths, for this purpose, a viscid substance, supposed to be the ordinary food of the species, prepared for their use by a sort of half digestion. They are also extremely careful to keep the young brood clean, by constant application of their tongue and mandibles; and a great amount of labor is daily

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expended upon them, in conveying them from the inner apartments of the nest towards the surface after sunrise, when the weather is fine, and back again before sunset, or when the weather becomes cold, or there is a prospect of rain. The same care is extended to the pupæ. The larvæ and pupæ are the white objects which the workers are seen hastily seizing and carrying off to places of safety, when an ant's nest is broken open; and the resemblance of which, particularly of the pupæ, to grains of barley, is supposed to have contributed to the general belief that ants amass stores of corn for winter food. The larvæ have no organs of locomotion. The pupæ are enveloped in delicate silken cocoons, and unlike those of other insects, require assistance to extricate themselves from them when they have attained their perfect state. This assistance also is afforded by the workers.

The whole supplies of food for the inmates of the nest are brought to it by the workers. The food of some kinds is exclusively or chiefly animal, that of others, vegetable. The provisions carried to their nests by the ants of Britain and other countries in which the winter is cold are apparently not intended for winter, when the creatures are entirely torpid, but only for present use; and few, if any, of the species feed on grain or seeds. But Col. Sykes discovered at Poonah a species of ants (*Atta providens*), which not only store up provisions, but of which the stores consist of the seeds of a species of millet; and Mr. Moggridge has recently determined by careful observation that large stores of grain and seeds are laid up by some of the ants of the s. of Europe, especially *Atta barbara* and *Atta structor*. The grain and other seeds stored up by ants seem, in some way not yet known, to be deprived of the power of germination. The ant has long been a sort of proverbial type, not only of industry, but of provident care for the future. Some ants, however, collect and carry to their nests substances which are not intended for food, but for the construction of the nest, and particularly for closing its apertures in cold or wet weather. In this way they gather together small heaps of chips of wood, bits of straw, small pebbles, etc.

The vegetable substance which ants seem chiefly to use as food is sugar; and to this, wherever it is to be found, they seem to be guided by a very acute sense of smell. *Honey-dew*, the saccharine excretion of the *Aphides* (see APHIS), is a favorite food of many species; and with this are connected some of their most extraordinary instincts; for not only do they climb the plants on which the aphides abound, that they may obtain this food, but they have been seen to wait beside them for new drops, and even to touch them with their antennæ, in order to cause the drops to flow, patting the abdomen of the aphis on each side alternately and rapidly; the ant, after the drop has been obtained, passing on to another aphis. The whole process has been likened to the milking of cattle. Even more wonderful things are asserted on this subject, as that particular ants seem to regard particular aphides as their own property, and are

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ready to fight in defense of their right to them—that, to secure them for themselves, they convey them from one place to another—and that the *Aphis radicum*, which derives its nutriment from the roots of grass and other plants, is actually kept in large numbers in the nest of the Yellow Ant (*Formica flava*), in order that there may be always at hand a copious supply of food, these aphides and their eggs sharing the solicitude of the ants equally with their own eggs and young. Things so wonderful are ascertained beyond dispute in regard to the instincts of ants, that even such statements as these must not be hastily rejected as incredible, and certainly they express the beliefs of careful and scientific observers.

Ants which feed upon animal food render important service in clearing away every vestige of the flesh of dead animals, and so preventing corruption; and very beautiful skeletons of small animals have been obtained by burying the animal for a short time in an ant hill. But ants also attack living animals: insects of comparatively large size fall a prey to them, and in tropical countries, birds, reptiles, and small quadrupeds are sometimes devoured by their vast swarms, which strip the bones of the animal perfectly clean with wonderful rapidity. Domestic animals, at least when sick, are not safe from them, and man himself regards them with dread. About a hundred years ago, vast numbers of a particular kind of ant (*F. saccharivora*) appeared in the island of Grenada. This species makes its nest under the roots of plants, and the sugar-canes were so weakened and

Yellow Ants (*F. Flava*) and Nest.

injured in consequence, that the plantations became nearly unproductive. 'They descended from the hills like torrents, and the plantations, as well as every path and road for miles, were filled with them. Rats, mice, and reptiles of every kind became an easy prey to them; and even the birds, which they attacked whenever they lighted on the ground in search of food, were so harassed, as to be at length unable to resist them. Streams of water opposed only a temporary obstacle to their progress; the foremost

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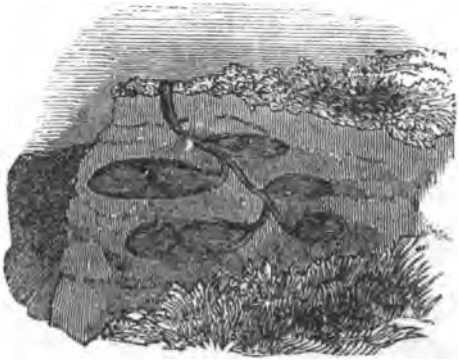
rushing blindly on certain death, and fresh armies instantly following, till a bank was formed of the carcasses of those which were drowned, sufficient to dam up the waters, and allow the main body to pass over in safety below. Even fire was tried without effect. When it was lighted to arrest their route, they rushed into the blaze in such myriads as to extinguish it.' A reward of $100,000 was offered in vain for an effectual means of destroying them; but in 1780, a hurricane which tore up the canes, and exposed their habitations to a deluge of rain, freed the island from this plague.

The habitations of ants are very curiously constructed, displaying great ingenuity, although with great diversity in the different species. The greater number of species form their habitations in the ground. These rise above the surface in the form of a dome; hence the name *ant-hills* commonly given them. The largest ant-hills formed by any British species are those of the large red or horse ants (*Formica rufa*), which are sometimes as big as a small haycock; but travellers in S. Amer. describe ant-hills of 15 or 20 ft. in height. The nest of *F. rufa* is outwardly of rude appearance—a confused heap of such portable materials as were within reach; but within, it contains numerous small apartments, of different sizes, arranged in separate stories, some deep in the earth, some above its surface, and communicating with each other by means of galleries. Use is made of the earth excavated from below to mix with other materials in the construction of the upper parts of the fabric. Many species of ants, sometimes called Mason Ants, construct habitations by a still more elaborate masonry, making



Section of Bank, showing Nests of the Mason Ant.

use, for this purpose, of soft clay, which they spread and mold by means of their mandibles and feet, appearing all the while to examine their work by their antennæ. The partition-walls of the galleries and apartments of the *Formica brunnea* are about half a line thick, and about half an inch high; the roofs are somewhat arched, and pillars are frequent in this marvellous architecture. M. Huber saw a

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working-ant of another species (*F. fusca*), without assistance, make and cover in a gallery which was two or three inches long, and of which the interior was rendered perfectly concave. There are other species, sometimes called Carpenter Ants, which make their habitations in the trunks of old trees, gnawing the wood into apartments and galleries, with floors and partitions as thin as card. *Formica flava* forms its partition-walls of a sort of *papier-mâché* of sawdust, earth, and spider's web. *F. smaragdina*, an East Indian species, forms its nest of a thin silk-like tissue. *F. bispinosa*, in Cayenne, makes a felt of the down which envelops the seeds of the *Bombax Criba*. An East Indian species, *Myrmica Kirbii*, forms a globular nest of a congeries of tile-like *laminæ* of cow-dung, the interior exhibiting an assemblage of apartments and galleries. Some Australian ants form their nests of the leaves of trees glued together, after being first brought into the proper position by the united strength of multitudes.

Nest of Carpenter Ant.

Of the ants which form their nests in the ground, some, instead of constructing ant-hills, seek the protection of stones, roots of trees, etc. This is the case with some of the British species, and also with the sugar ant of the West Indies, already mentioned.

Many interesting anecdotes are on record illustrative of the instincts of ants, and of the sagacity which they seem to possess. They appear also to have some power of communicating with each other, in which it has been supposed that the antennæ are chiefly employed. Some such power might be supposed to be necessary, if we could venture to reason from analogy upon such a subject, not only to their architectural and other ordinary operations, in which many must take part, systematically and conjointly, but also in their predatory and warlike excursions; for these also some of the species have. If, during the predatory excursions of the *Atta cephalotes* (S. Amer. species), an intervening space occurs which they cannot cross, some of the creatures link themselves together—as monkeys, in like circumstances, have been known to do—forming a bridge over which the main body passes. Ants are, in general, both courageous and pugnacious. Many battles take place among them, both between individuals and large parties; and after a battle, combatants may be found locked in each other's arms, as having died together in the struggle. More extraordinary than anything of this kind, however, is the fact, sufficiently ascertained, that some species of ants go on regular forays to carry off the larvæ and pupæ of certain other species,

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which they carry to their own habitations to rear and employ them as slaves in the work which might be regarded as properly belonging to workers of their own race—a fact to which no other at all analogous has yet presented itself in natural history. The species known thus to make and keep slaves are *Polyergus rufescens* and *Formica sanguinea*, both sometimes called Amazon Ants. It has been noted as a curious circumstance that the kidnappers are red or pale-colored ants, and the slaves jet black. The kidnapping excursions take place only at a particular period of the year, when the nests of the black ants contain the neuter brood. The army of red ants (*P. rufescens*) marches forth, the vanguard, which consists of eight or ten only, continually changing; and on their arriving at the nest of the negro ants, a desperate conflict ensues, which ends in the defeat of the negroes; and thereupon the red ants, with their powerful mandibles, tear open the now undefended ant-hill, enter it, and emerge, carrying the pupæ in their mouths, with which they return in perfect order to their own nest. The pupæ are there treated with great care, and spend their lives among the red ants, excavating passages, collecting food, carrying larvæ, etc., as if this had been their original destination. The amazon ants are not natives of Britain, although plentiful in some parts of Europe.—The Agricultural Ants of Texas are a recent discovery—said to plant, as well as harvest, a species of grass (*Aristida*): and the Honey Ant of Texas sets apart some individuals as living bottles of honey, vastly distended, from which the rest draw supply: see Plate II.

TERMITES (q.v.), or WHITE ANTS, are very different from the true ants, and belong to the order *Neuroptera*. See Lubbock's *Ants, Bees, and Wasps* (1882). See FORMIC.

ANTACID, *ănt-ăs'ĭd* [Gr. *anti*, against; L. *acĭdus*, acid]: any substance, as *potash*, *soda*, *magnesia*, *lime*, etc., which counteracts acidity or neutralizes it, especially in the stomach and intestinal canal, by directly combining with the free acid that may be present. The action of antacids is obviously merely temporary, as, unless combined with other medicines, they do not correct the morbid condition which causes the undue acidity; and their too prolonged use must be carefully avoided, since, at all events, some of these medicines, as the alkalies and their carbonates, are liable to induce a state of general anæmia, morbid deposits in the urine, and a series of symptoms not unlike those of scurvy. Antacids are best given in association with vegetable tonics; and for the reasons already stated, their administration must be carefully watched, and should be occasionally omitted. Dr. Neligan makes the following excellent remarks on the particular remedy to be employed for special forms of acidity: 'When the acid exists in the stomach in the gaseous state, ammonia or its carbonates should be preferred, as, in consequence of their volatility, a gaseous acid which would elude the action of the fixed alkalies may be neutralized by them. If the acidity be present in the lower bowel, as in the cæcum or colon, magnesia or lime ought to be administered, as being less likely than the other antacids

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to be neutralized or absorbed before it reaches that portion of the intestinal canal. When the acid exists in the urinary organs, the alkalies will be found best adapted, as they have a tendency to act more directly on the kidneys; and when it is *lithic* (or *uric*) *acid* which preponderates in the urine, the preparations of lithia or potash should be preferred to those of soda, as the salts formed by the two former with the acid in question are much more soluble than those formed with the latter. In persons of a corpulent habit of body, potash is to be preferred to ammonia or soda when the use of an alkali is indicated. And finally, ammonia and its preparations are best adapted for the old and debilitated, as also for those of enfeebled constitution.' The antacids include solutions of ammonia, lime (commonly known as lime-water), potash, and soda, various carbonates of these substances, magnesia and its carbonates, and the carbonate and citrate of lithia.

Many of the medicines of this class possess other properties besides that of neutralizing free acids.

ANTÆ: see PILASTER.

ANTAGONIST, n. *ăn-tăg'ō-nĭst* [F. *antagoniste*, an antagonist—from Gr. *antagōnis'tēs*, a combatant—from Gr. *anti*, against; *agōnis'tēs*, a combatant]: one who contends with another; an opponent; an enemy. ANTAG'ONISM, n. *-nĭzm*, active opposition. ANTAGONIZE, v. *ăn-tăg'ō nīz*, to act in opposition; to strive against. ANTAG'ONIZ'ING, imp. ANTAG'ONIZED, pp. *-nīzd*. ANTAGONISTIC, a. *ăn-tăg'ō-nĭs'-tĭk*, striving against. ANTAG'ONIS'TICALLY, ad. *-nĭs'tĭ-kăl-ĭ*. ANTAG'ONIS'TIC FORCES, two powers in nature, the one counteracting the other, as fire and water.—SYN. of 'antagonist': an adversary; enemy; opponent; foe.

ANTALCIDAS, *ăn-tăl'sĭ-dăs:* a Spartan statesman, who in the earlier part of the 4th c. B.C. was conspicuous in a very perilous crisis of the history of his nation by his skilful policy. Some time after the Peloponnesian War, it seemed as if Athens were destined to regain the supremacy she had lost. The Greek states rallied round her; while Conon, an able and vigilant Athenian admiral, and his ally, Pharnabazus, the Persian, were everywhere victorious in their naval encounters with the Spartan fleet. It became necessary, therefore, that communications should be entered into with the Persian king, from whom the confederate Greeks drew their chief resources. A. was chosen ambassador to Tiribazus, satrap of w. Asia. On hearing this, the Athenians grew alarmed, and sent Conon to frustrate the schemes of the former; but Tiribazus took A.'s part, and the result was that Conon was thrown into prison, and A. secretly received money to enable Sparta to continue the war. At first, Artaxerxes, the Persian monarch, was dissatisfied with the conduct of his satrap, recalled him, and put Struthas, a friend of Athens, in his place; but through a complication of circumstances, A. was subsequently completely successful in securing the good-will of Artaxerxes. He was then appointed admiral of the Spartan fleet, and assisted by Tiribazus, Ariobarzanes, etc., swept

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the seas until Athens became desirous of peace. For various reasons, so was Argos, also Sparta. Tiribazus therefore assembled deputies from the Greek states, and, in the name of his master, Artaxerxes, read the famous declaration or treaty of peace, to which all the members present agreed, and which is known in history under the name of 'the Peace of Antalcidas,' as being the result of the latter's able diplomacy. Its three great points were as follows: 1. That all the Greek towns on the mainland of Asia Minor, together with the islands Clazomene and Cyprus, should remain under the protection of the Persian king. 2. That all other Greek towns, large and small, should be independent; but that the islands of Lemnos, Imbros, and Scyros should belong to Athens. 3. That war should be declared against whatever state refused to accept these points. After this peace, the history of A. becomes doubtful and obscure. He seems to have lost favor with the Persians, and Plutarch even leads us to suppose that, sickened by misfortune and the loss of reputation, he starved himself to death; but this story is not credited by scholars, both on account of its intrinsic improbability and its apparent disagreement with the statements of other writers.

ANTALGIC, a. *ănt·ăl'jĭk* [Gr. *anti*, against; *algos*, pain]: applied to that which can assuage pain.

ANTANACLASIS, n. *ănt·ăn'ă-klă'sĭs* [Gr. *anti*, *anaklasis*, a bending back and breaking]: in *rhet.*, a figure which consists in repeating the same word in a different sense; as, whilst we *live*, let us *live*. In *gram.*, a repetition of words, beginning a sentence, after a parenthesis; as, 'shall that heart (which not only feels them, but which has all motions of life placed in them) *shall that heart*,' etc.

ANTANANARIVO, *an-tâ-nâ nâ're-vō'*, or TANÀNARÌVO: cap. city of Madagascar; on a hill, in an undulating district, 5,000 ft. above the level of the sea. It is exposed to fearful thunder-storms. The approach to it from Tamatave, the chief seaport, is extremely tedious and difficult, owing to the want of roads. It is nevertheless the seat of considerable trade and industry. The royal palace occupies the summit of the hill; adjoining are the dwellings of the chief officers of government; and below these, covering the slope of the hill, and built on terraces, are the houses of the other inhabitants, constructed of mud and sun-dried bricks. The people have considerable aptitude for civilized usages; and, thanks to missionary enterprise, considerable progress has been made towards the adoption of European habits.—See the works on Madagascar by Mullens (1875) and Grandidier (1876); also *Three Visits to Madagascar* (1858) and *Madagascar Revisited* (1867) by Ellis. In the latter work will be found a plan of the city, showing the missionary churches, chapels, dispensary, hospital, etc., and views of the principal houses. Pop. estimated 80,000.

ANTAR, *ân'tar*, or ANTARA, *ân'tâ-râ:* celebrated Arab chief of the 6th c., one of the seven poets of Arabia, whose prize-poems, embroidered in golden characters on a silken ground, were hung up on the gate of the Caaba, and thence

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called *Moallakat*—i.e., the Suspended. In his poem that has descended to our day, he paints his warlike deeds, and his love for Abla. His courage and heroism during a forty years' warfare between two Arab tribes, and his constancy in love, were long dear to the memory of his countrymen, and appear to have formed the groundwork of the voluminous romance called *Antar*, commonly ascribed to Asmai, and reduced to writing as early as the days of the Caliph Haroun-al-Raschid, in the 8th c. This work, which has come down to us in a later and much corrupted form, gives an attractive and faithful picture of Bedouin life, and is rich in epic interest, although too monotonous to satisfy the taste of the European reader. In the East, however, it still supplies the favorite themes of the professional story-tellers who haunt the coffee-houses. A poetical translation of it into English was made by Terric Hamilton, 1820.

ANTARCTIC, a. *ănt'ärk-tĭk* [Gr. *anti*, opposite; *arktos*, the constellation of the Bear]: opposite to the northern or Arctic pole; a circle about 23½ deg. from the s. pole.

ANTARCTIC OCEAN, or SOUTHERN OCEAN: the sea round the south pole, as the *Arctic Ocean* round the north. It comprises all the sea to the s. of the Atlantic, and the Indian, and the Pacific oceans. In this view, the A. O.'s northern limit may be conveniently divided into three straight lines—the *first* between Cape Horn in S. Amer. and Cape Agulhas in Africa; the *second*, between Cape Agulhas and the s. extremity of the Auckland Islands as an appendage of New Zealand; and the *third*, between the s. extremity of the Auckland Islands and Cape Horn. This appears to form the true boundary of the polar regions of the s. hemisphere. The most northerly isles which it incloses are New Georgia, at the mouth of the Atlantic, and Kerguelen's Land, at the mouth of the Indian Ocean. The latter tells its own story in its other title of 'The Island of Desolation;' and the former presented to Cook, even in the middle of summer, perpendicular cliffs of ice, and valleys covered with everlasting snow.

It is usual, indeed, to define the Antarctic Ocean and the corresponding ocean to the n., as being contained each within its own polar circle. But, with regard to both oceans alike, this definition appears to be inadmissible. It is only at two points—the head of the Pacific and the head of the Atlantic—that the Arctic Sea can possibly reach the Arctic Circle at all; while, in point of fact, it overlaps it at Behring's Strait by nearly a degree, and falls several degrees short of it between the n. half of Norway and the s.e. shore of Greenland. The A. O., again, is nowhere practically limited by the definition in question: not a single voyager hesitates to use the expression long before he arrives at lat. 66° 30′ s., nor is a single authority consistent in the use of the arbitrary nomenclature.

The A. O. has been explored, more or less satisfactorily, by various navigators, as far as 79° s. With a few exceptions, however, little of it is accurately known, the difficulties and dangers of its navigation rendering thorough and

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continuous investigation almost impracticable. The names that may be found in their proper places are New Georgia, Kerguelen's Land, Sandwich Land, New South Shetlands, New Orkneys, Enderby's Land, Graham's Land, Balleny, Sabrina, and Victoria Land.

Taken as a whole, these lands bear a very small proportion to the extent of an ocean which embraces half the latitudes and all the longitudes of the s. hemisphere, exceeding its kindred sea to the n., as a glance at the map will show, by nearly half of Asia and N. Amer., and the whole of Europe. Such of these lands as are really accessible at all times have been more or less valuable in connection with the whale and seal fisheries.

The features of the A. O. itself, briefly stated, are constant fogs, baffling currents, innumerable icebergs, and magnificent manifestations of the Aurora Australis. On the coast of Victoria Land, beyond the parallel of 70°, two mountains have been observed to be of a height altogether unequalled in such a latitude—Mt. Terror, 10,000 ft., and Mt. Erebus, 12,400. The latter is a volcano, being, it is apprehended, the only phenomenon of the kind in either of the frigid zones.

Of the two circumpolar oceans, the southerly one has excited much less interest than the northerly. The open passages round the two capes respectively into the Indian Ocean and the Pacific, have, from the very beginning, rendered unnecessary any such voyages as those which, for nearly three centuries, have developed so much patience and fortitude in the heroic explorers of the Arctic shores.

ANT-BEAR: see ANT-EATER.

ANT-CATCHER, and ANT-THRUSH: birds of tropical and sub-tropical countries, which feed chiefly upon ants. They are closely allied to the Thrushes (see THRUSH), and are included with them in the family *Turdidæ* or *Merulidæ* of recent ornithologists. They are distinguished by a straight sub-cylindrical strong bill, hooked at the tip, slender legs, and very short tails. They form the genus *Myothe'ra* of Illiger, now subdivided into several genera, one of which, *Pitta*, contains the *Brèves* of Buffon—birds of brilliant plumage, natives of s.e. parts of Asia and the Malayan archipelago. The true ant-catchers are mostly American, are of comparatively sober plumage, live among the huge ant-hills, seldom fly, and are remarkable for their sonorous voices, the power of which in some species is extraordinary. The largest species, known as the *King of the Ant-catchers* (*Grallaria Rex*), is about the size of a quail. Its legs are remarkably long.

ANTE, *ăn'tē* [L.]: a prefix meaning *before*, either in time or place.

ANT-EATER (*Myrmeco'phaga*): genus of S. Amer. quadrupeds belonging to the natural order *Edentata*. The species are few. They are perfectly toothless, their food being insects, and particularly ants, which they procure in great numbers by thrusting among them a very long cylindrical tongue, covered with a viscid saliva, and then retract-

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ing it into the mouth. The head is remarkably elongated, with a slender muzzle, and a small mouth. The tongue is doubled up in the mouth when not in use for catching prey. The ears and eyes are very small. The toes differ in number in

Great Ant-eater (*M. Jubata*).

the different species, but are united as far as the base of the claws, which are very large and strong, adapted to tearing up the habitations of ants. The great A.-E. (*M. Jubata*), a native of the warm parts of S. Amer., and called in Demerara the Ant-bear, is about 4½ ft. in length from the snout to the origin of the tail, which is more than two ft. long, and is covered with very long hair. The body is also covered with long hair, particularly along the neck and back. There are four claws on each of the fore-feet and five on the hind ones. The A.-E. spends much of its time in sleep, the long snout concealed in the fur of the breast, the hind and fore claws locked together, and the bushy tail thrown over all, as if for a shade from the sun. It is very unsocial in its habits, and is regarded as very stupid. It has great strength in its fore-legs and claws, and is said to hug like the bear, so as to crush an enemy to death. The female produces one young one at a birth, and carries it about for some time on her back.—Another species, the Tamandua (*M. Tamandua*), having the same number of claws, has a less elongated snout, comparatively short hair, and a prehensile tail, is scarcely as large as a cat, and climbs trees in quest of its insect food.—The Little or Two-toed A.-E. (*M. didactyla*) differs from these species not only in the number of its toes, but in other anatomical characters.—Closely allied to this genus in structure and habits is the genus *Manis*, containing the PANGOLINS of Africa and India; but instead of hair, the body is covered with strong horny scales. See PANGOLIN. —The name A.-E. is given at the Cape of Good Hope to the *Orycteropus Capensis*, the Aard-vark or Earth-hog of the Dutch colonists, a quadruped of about the same size with the great A.-E. of America, belonging to the same natural order, and resembling it also in its elongated muzzle and extensile tongue, which it employs in the same way, but provided with grinding teeth and flat claws adapted for burrowing. It burrows with extraordinary facility, and it is in this way that it seeks to secure its safety when assailed. It has very short hair, and little of it. The ears are moderately long. It is a nocturnal animal, and very timid.—The *Echidnæ* of New Holland are sometimes called Porcu-

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pine Ant-eaters, from their food, and their similarity to the true ant-eaters in their sharp muzzle and extensile tongue; but they differ much in some parts of their structure. See ECHIDNA.

ANTECEDE, v. *ăn'tĕ-sēd'* [L. *antĕcēdĕrĕ*, to go before—from *ante*, before; *cedo*, I go]: to go before in time. AN'TECE'DING, imp.: AN'TECE'DED, pp. AN'TECE'DENT, n. *-sē'dĕnt*, that which goes before in time or place: ADJ. going before in time or place. AN'TECE'DENTLY, ad. *-lĭ*. AN'TECE'DENCE, n. *-dĕns*, or AN'TECE'DENCY, n. *-sĭ*, the act or state of going before in time. AN'TECE'DENTS, n. plu *-dĕnts*, the previous life and character of a person. AN'TECES'SOR, n. [L. *ante*, *cessus*, gone]: one who lived or possessed before another.—SYN. of 'antecedent, a.': precedent; preceding; foregoing; previous; anterior; prior; former.

ANTECEDENT: a term in Logic, Grammar, and Mathematics. Thus in Logic, a proposition from which another is deduced, or a general principle which serves as the base and support of some particular proposition, is called the A. In Grammar, the A. is the word which precedes the relative—e.g., 'The *man* who dies for his country should be held in honor': here 'man' is the A. In Mathematics, the A. of a ratio is the first of two terms which compose the ratio; thus, in the ratio of 4 to 3, 4 is the A. The word is also used in the plural in a peculiar sense. 'We know very little of his *antecedents*'—i.e., of his previous character or conduct.

ANTE-CHAMBER, n. *ăn'tĕ-chām'bĕr*, or ANTE-ROOM, n. [L. *ante*, before]: a room to be passed through to a principal room.

ANTECIANS, n. plu. *ăn'tē'shĭ-ănz*, or ANTŒCI, n. plu. *ăn-tē'sī* [Gr. *anti*, against; *oikĕō*, I dwell]: those who live in the same latitude and longitude, but on different sides of the equator.

ANTEDATE, v. *ăn'tĕ-dāt* [L. *antĕ*, *datus*, given]: to date before the true time. AN'TEDA'TING, imp. AN'TEDA'TED, pp.

ANTEDILUVIAN, a. *ăn'tĕ-dĭ-lō-vĭ-ăn*, or ANTEDILUVIAL, a. *-vĭ-ăl* [L. *ante*, *dilu'viŭm*, a deluge]: existing or happening before the flood of Noah. AN'TEDILU'VIAN, n., one who lived before the flood. The A. ages are those which elapsed before the flood, and, in theological language, the A. religion means the religion of the patriarchs from Adam to Noah. In Geology, the 'A. period' has no reference to the deluge recorded in the Mosaic narrative, but only to the latest transformation of the earth by means of water.

ANTELIOS, a. n. *ănt-ē'lĭ-ŏs:* opposite or over against the sun; another spelling ANTHELIOS. See ANTHELION.

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ANTELOPE, n., *ăn'tē-lōp* [F. *antilope*—from Gr. *antholops*—from *anthos*, beauty; *ops*, the eye]: genus of Mammalia belonging to the order of Ruminants (q.v.), and to the hollow-horned section of that order—in which the horns consist of an elastic sheath surrounding a bony process of the skull, and are permanent, not annually renewed. The antelopes have the bony nucleus of the horns solid, not occupied, as in those of goats, sheep and oxen, to a considerable extent, with cells communicating with the frontal sinuses. They are also distinguished from the allied genus of goats by having the chin beardless, and from them and sheep by the horns not being longitudinally angled or ridged. The horns of antelopes are, however, very generally annulated, or surrounded with thickened rings. The body is slender and deer-like, the feet small and elegant, the tail short and tufted, the hair generally short, and the color often lively. Some species, however, have comparatively long hair; and a few which inhabit cold mountainous regions are clothed with wool intermixed with longer and coarser hair, particularly the CHAMOIS (q.v.) of the Alps, Caucasus, etc.; the ROCKY MOUNTAIN GOAT (q.v.) of N. Amer., and the CHIRU (q.v.) of the Himalayas. Many species have infra-orbital sinuses or *tear-pits* like DEER (q.v.). The females of many species, as of deer, are destitute of horns; and if they alone came under observation, it would be difficult to say to which genus they belonged. The size is very various; the Guevei or Pigmy A. of Africa (*A. pygmæa*) is only 8 to 9 inches high at the shoulder, while the largest species measure 5 or 6 feet. Almost all the species of antelopes are peaceable, timid animals, and are distinguished by their agility and fleetness. Most of them are gregarious. Some inhabit plains; other are found only in the most inaccessible mountainous regions; other dwells in jungles and deep forests. N. Amer. possesses two or three species, which depart considerably, as does also the chamois of Europe, from the typical character of the genus. Europe produces only the Chamois and the Saiga (*A. Saiga*), the *Colus* of Strabo, which inhabits the s. plains of Poland and Russia. Asia has a greater number of species; but they are most numerous in Africa, and particularly in s. Africa. The known species amount to more than eighty, which are arranged in sections or groups according to the peculiarities of the horns and other characters, but a satisfactory classification of them is difficult. Now naturalists make a family of *Antilopeæ*, and subdivide it into genera, for they can be separated by sufficiently marked characters. The flesh of all antelopes is used as food; hence they are much objects of the chase. They furnish also great part of the subsistence of beasts of prey in Africa, where some of the species exist in such numbers that, particularly when severe drought occurs in the regions which they ordinarily inhabit, dense and multitudinous herds occasionally appear in the interior of Cape Colony, to the terrible devastation of the crops. Even the saigas of the Tatarian plains congregate in herds of many thousands in the end of autumn.

The name A. is sometimes more particularly restricted to

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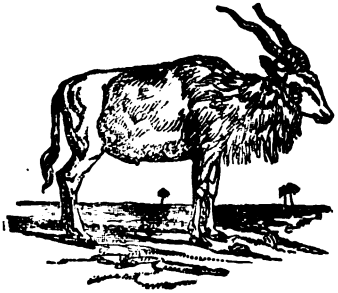
a species also known as the Common or Indian A., and as the Sasin. It is a native of India and the eastern parts of Asia, and is a beautiful animal, about 2½ ft. high at the shoulder, with erect, diverging horns, bent in a spiral of two or three turns. The hair is uniformly short, except that, as in many other species of A., there are small tufts of bristles on the knees. It inhabits open plains, and the herds exercise great watchfulness. Its fleetness is such that greyhounds chase it in vain; and it can easily bound over an inclosure of 11 ft. in height, or over a distance of 10 or 12 yards. The flesh is held in small esteem, and the animal is less than many of its congeners an object of the chase.—The Saiga is a much less graceful animal; its horns are short, and, as in many of this genus, curved first outwards and then inwards, so that the whole outline formed by them resembles that of a lyre. The horns are used by the Russians and Chinese for the manufacture of many articles of domestic economy; and it is chiefly for their sake and that of the skin that the saiga is hunted, the flesh having a disagreeable taste, ascribed to the saline and aromatic plants of the steppes.—The Dzeren (*A. gutturosa*), sometimes called



Addax (*A. Addax*).

Head of Antelope Chikara.

the Chinese A., and known among the Chinese by a name which signifies the Yellow Goat, is an inhabitant of the arid deserts of Central Asia, the flesh of which is highly esteemed, and which is therefore a chief object of the chase in these regions. It derives its specific name from a large movable goitre-like protuberance on the throat of the old males, produced by a dilatation of the larynx.—The Addax, or Nubian A. (*A. Addax*), known to the ancients, and mentioned by Pliny, has horns very similar to those of the Indian A., but is a larger animal, less graceful, with a slight mane on the neck, a tuft of long hair on the forehead, and large broad hoofs adapted for treading on fine and loose sands. It inhabits the deserts of Central Africa, and, contrary to the usual habits of the genus, is said not to be gregarious but to live in pairs. The Chikara and some other Indian species are distinguished by two additional rudimentary horns in front of the ordinary horns, and im-

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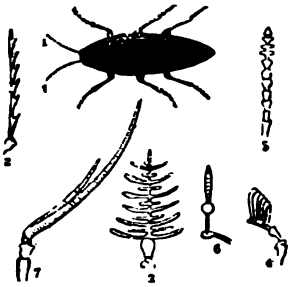
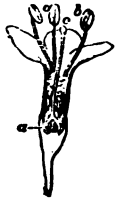
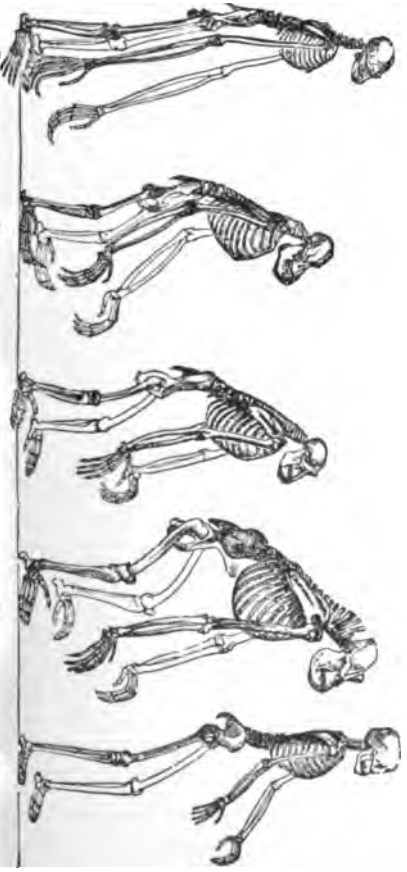


Antennæ.—1, 1, Filiform Antennæ of Cucujo Firefly of Brazil (*Pyrophorus luminosus*); 2, Denticulate Antenna; 3, Bipinnate; 4, Lamellicorn; 5, Clavate; 6, Geniculate; 7, Antenna and Antennule of Crustacean.



b,b. **Anthers.**



Skeletons of Anthropoid Apes compared with that of Man: G, Gibbon (for distinctness, given about twice the proportional size); O, Orang-otang; C, Chimpanzee; Go, Gorilla; M, Man. (After Huxley.)

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mediately over the orbits. The chikara inhabits thick forests and jungles. Like the addax, it lives in pairs; as do also the Stein-boc (q.v.) of s. Africa, an extremely graceful species; and the Kleene-boc of the same country (*A. perpusilla*), a beautiful and active little creature, with very small horns. The kleeneboc is of a mild and gentle disposition, and extremely capable of domestication. The Gazelle (q.v.) of n. Africa (*A. Dorcas*), one of the species known to the ancients, is very frequently domesticated; and from its gracefulness of form, its gentleness of manners, and its bright black eyes, has afforded to the Arabian poets one of their most favorite objects of comparison. The s. African SPRING-BOC (q.v.) is another very beautiful species, and is frequently domesticated by the colonists at the Cape of Good Hope. Among the numerous species which that country produces may be mentioned also the Blauw-boc (*A. leucophæus*); the Riet-boc (*A. arundinaceus*); and the Kaffrarian ORYX (q.v.), (*A. Oryx*), which somewhat resembles, but is quite distinct from, the ORYX of the ancients (*A. Leucoryx* or *A. Gazella*), also called the Algazel, a native of the countries on both sides of the Red Sea. Still more worthy of notice among the s. African species, but in some measure departing from the strict A. type, is the ELAND (q.v.), the largest of all the antelopes—an animal which may yet probably be found very valuable in domestication. The KUDU (q.v.) is another noble species, allied to the eland. The NYL-GHAU (q.v.) of India, and the GNU (q.v.) of s. Africa, are also among the largest antelopes, but depart still further from the generic type, particularly the latter, so that a separate genus (*Catoblepas*) has been constituted for it, having better claims to be recognized than the other genera into which it has been proposed that the antelopes should be divided. Less different from the ordinary type, but still with a marked approach to a bovine appearance, are the BUBALUS (q.v.) of the ancients, a native of the n. of Africa, the Arabic name of which signifies wild ox, and the KAAMA (q.v.) or Harte-beest of the Cape of Good Hope, which is nearly allied to it. The PRONG-HORN (q.v.) and the ROCKY MOUNTAIN GOAT (q.v.) are the best known N. Amer. species, and both are found only in the w. parts of the continent. It has been proposed to introduce the latter, as a wool-bearing animal, into the Highlands of Scotland. The Pronghorn sheds its horns.

ANTELUCAN, a. *ăn'tĕ-lū'kăn* [L. *antĕlucā'nus*, that takes place before daylight—from *ante*, *lux* or *lucem*, light]: before the dawn or daylight.

ANTE-MERIDIAN, a. *ăn'tĕ-mĕ-rĭd'ĭ-ăn* [L. *ante*, *meridĭ'ēs*, mid-day]: before noon or twelve o'clock. POST-MERID'IAN, after twelve o'clock.

ANTE MUNDANE, a. *ăn'tĕ mŭn'dān* [L. *ante*, *mundus*, the world]: before the creation of the world.

ANTE-NICENE, a. *ăn'tĕ-nī'sēn* [L. *ante*, before; *Nicæa*, Nice, a city of Asia Minor, at which the Nicene Creed was promulgated by a general council held there, A.D. 325]: anterior to the first council of Nice.

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ANTENNÆ, n. plu. *ăn-tĕn'nē* [L. *antenna*, a sail-yard]: the feelers or horns of insects, crustacea, etc. ANTEN'NAL, a. pertaining to. ANTENNULES, n. plu. *ăn-tĕn-ūlz*, applied to the smaller pair of antennæ or feelers in the crustacea.

ANTENNÆ, in Zoology: jointed filaments with which the heads of Insects, Crustacea, and Myriapoda are furnished, and which are evidently very delicate organs of touch. They are therefore sometimes called feelers. The A. are placed on the anterior or superior part of the head; the animals appear to feel their way with them, and to them is ascribed the bee's power of working in the dark. Some suppose that they are also organs of hearing, and by means of them it appears that many insects, as bees and ants, have the power of communicating with one another. They have great flexibility, but differ very much in the number of joints which they contain (amounting sometimes even to 100), in the relative length and thickness of their joints, and also in their form, being filiform or thread-like, clavate or club-shaped, feathered, etc., in endless variety.

ANTENUPTIAL, a. *ăn'tĕ-nŭp'shăl* [L *ante*, *nuptiæ*, marriage]: before nuptials or marriage.

ANTE-PASCHAL, a. *ăn'tĕ-păs'kăl* [L. *ante*, and *paschal*]: pertaining to the time before Easter.

ANTEPAST, n. *ăn'tĕ-păst* [L. *ante*, *pastus*, fed]: a foretaste.

ANTEPENDIUM, n. *ăn'tĕ-pĕn'dĭ-ŭm* [L. *ante*, before; *pendĕo*, I hang on]: in *R. Cath. Ch.*, a covering for the front of the altar—red, purple, etc., according to the color of the vestments for the mass of the day.

ANTEPENULT, n. *ăn'tĕ-pĕ-nŭlt'* [L. *ante*, before; *penĕ*, almost; *ultimus*, last]: in *a word*, the last syllable but two. ANTEPENULTIMATE, a. *-pĕn-ŭl'tĭ-măt*, pertaining to the last syllable but two.

ANTEQUERA, *ăn-tā-kā'rā* (*Antiquaria* of the Romans): important town in the province of Malaga, Spain; in a fertile plan, 45 m. w. of Granada. The inhabitants are engaged chiefly in agricultural operations, but also manufacture baize, silk, cotton, and paper. They are noted for their love of bright colors in dress. Although A. is clean and well built, it is rarely visited by travellers, being considerably off the high road. As late as 1544, the place possessed, in almost perfect condition, an ancient palace and theatre; but about that time the stones were plundered to build a convent, and only a few were spared, now imbedded in the walls of the town. A., like all the other cities of s. Spain, was for a while in the hands of the Moors; but in 1410 it was retaken by the regent Fernando, hence called *El Infante de A.* When the French took the place, during the Peninsular War, they converted a curious old mosque—a relic of Moorish sway—into a storehouse, and on their departure carried off with them the magnificent Moorish armory. Pop. 25,550.

ANTERIOR, a. *ăn-tē'rĭ-ér* [L.]: before in time or place; previous; in front. ANTE'RIORLY, ad. *-lĭ*, in an anterior

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manner; before. ANTE'RIOR'ITY, n. *-i-ti*, state of being before; priority.—SYN. of 'anterior': preceding; antecedent; foregoing; former; previous; prior; precedent.

ANTHELION, n. *ănt-hēl'yŭn* [Gr. *anti*, over against; *hēlĭŏs*, the sun]: a bright spot or glory of light seen opposite the sun; sometimes seen around the head of his shadow, or a mock sun. ANTHE'LIA, n. plu., also called 'glories of light;' luminous rings, seen by an observer on a cloud or fog which lies opposite to the sun. They occur chiefly in alpine regions and in the polar seas, and are only seen when sunshine and cloud, or fog, occur at the same time. They appear in the following way: when, from an elevated position—as the mast of a ship, or the ridge of a hill—the shadow of an observer is projected by the sun on a cloud or fog, he sees the head encircled by a glory or luminous ring, diminishing in brightness as it leaves the head as a centre. When the sun shines brightly, and the fog is dense, as many as four concentric rings of this nature are seen by the observer round the shadow of his head, having their common centre in the point where a line from the sun through the eye of the observer meets the fog. When the phenomenon assumes this form, the rings are more or less colored—the colors of the two inner rings being generally brilliant, those of the third more faint, while those of the fourth are scarcely perceptible. This last has an angular radius of about 40°, and is very seldom seen. It bears frequently the name of the Circle of Ulloa or the White Rainbow. A phenomenon substantially similar to the A. occurs when, the sun being near the horizon, the observer sees an aureola surrounding the shadow of his head cast upon grass or grain moistened with dew. The occurrence of A. is generally attributed to the diffraction (q.v.) of light.

ANTHELMINTIC, a. *ăn'thĕl-mĭn'tĭk* [Gr. *anti*, against; *helmins* or *helmin'tha*, a tape-worm]: destructive to intestinal worms: N. the medicine for intestinal worms: such are oil of fern, oil of turpentine, pink-root, pomegranate seeds, pumpkin-seeds, santonin, senna.

ANTHEM, n. *ăn'thĕm* [Gr. *anti*, opposite; *humnos*, a hymn: F. *antienne*]: a sacred song, or a portion of Scripture set to music; short sentences of texts used in a Liturgy. *Anthem* is by some authorities considered to be simply *anti-hymn*, in the sense of a composition different in words and music from the ordinary church hymn. *Anthem* is by others said to be from Gr. *anti*, opposite; *phone* voice; a piece sung in alternate parts; thus a mere corruption of mid. L. or Gr. *anti-phōnă*, meaning an answering sound: to this it may be objected that we have its derivative *antiphon* in common use in its own proper sense from the earliest times, especially in the R. Cath. Church, in whose service the word *anthem* is unknown. F. *antienne* is plainly connected with Eng. *anthem*, but can only by force be regarded as a derivative from *antiphōna;* F. *antiphone* = Eng. antiphony. We have such OE. forms as *anthymn* and *anthym*. The A. was introduced into the service of the English Church after the Reformation, and appointed to be sung daily, at morning and evening service, after the third collect. The

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words of the A. are taken from the Psalms, or other suitable parts of the Scriptures, and the music is either for solo, soli, or chorus, or a mixture of all three. As a specimen of English music, it can be heard to perfection only in cathedral service. In its origin, musical construction, and use, it is similar to the motet of the R. Cath. Church, which name has been retained by the Lutheran Church. See ANTIPHONY; MOTET.

ANTHEMIS: see CHAMOMILE.

ANTHER, n. *ăn'thĕr* [Gr. *anthēros*, flowery, blooming]: in *bot.*, the head part of the stamen of a flower, containing the pollen or fertilizing dust. AN'THERAL, a. *-ăl*, pertaining to. ANTHERIFEROUS, a. *ăn'thĕr-ĭf'ĕr-ŭs* [L. *fero*, I bear]: bearing anthers or flowers. AN'THERID'IUM, n. *-ĭd-ĭ-ŭm* [Gr. *eidos*, resemblance]: the supposed male organ in cryptogams. See STAMEN.

ANTHERIDIUM, *ăn'thĕr-ĭd'ĭ-ŭm:* name given by late botanists to an organ in the mosses and ferns which they suppose to be analogous in its functions to the stamen or male organ of fructification in phanerogamous plants. Antheridia are variously situated on the surface of plants or within their tissue. Sometimes they are simple cells; sometimes they are composed of a number of cells, containing a mucilaginous fluid, and peculiar small bodies called *Phytozoa* (q.v.), which at a certain period exhibit active movements like those of animalcules. The antheridia finally discharge their contents through an opening; and it is reasonably supposed their contact with another class of organs, to which the name PISTILLIDIUM (q.v.) has been given, is essential to the production of a sexually generated kind of spores, needed to recruit the species, though ferns, as well as many lower flowerless plants, also produce asexual spores. See also ARCHEGONIUM.

ANTHEROZOIDS, n. plu. *ăn'thĕr-ō-zō'ĭdz* [Gr. *anthēros*, flowery, blooming; *zoē*, life; *eidos*, resemblance]: the movable, impregnating, or male corpuscles of the algæ, mosses, and ferns;

ANTHESIS, n. *ăn-thē'sĭs* [Gr. *anthēsis*, bloom—from *anthos*, a flower]: in *bot.*, the opening or bursting of the flower; the period of blooming.

ANTHOCARPOUS, a. *ăn'thō kâr'pŭs* [Gr. *anthos*, a flower; *karpos*, fruit]: formed, as a certain class of fruits, from the united ovaries of a number of flowers.

ANTHOCYANE, n. *ăn'thō sī'ăn-ē* [Gr. *anthos*, a flower; *kuanos*, dark-blue, sky-colored]: the supposed blue coloring matter in flowers of that hue.

ANTHODIUM, n. *ăn-thō'dĭ-ŭm* [Gr. *anthōdēs*, flowery—from *anthos*, a flower; *eidos*, resemblance]: the capitulum or head of flowers of composite plants.

ANTHOLITES, n. plu. *ăn'thō-līts*, or ANTHOLITHES, n. plu. *ăn'thō-lĭthz* [Gr. *anthos*, a flower; *lithos*, a stone]: a general term for the fossil impressions of flowers, such as occur in the shales of the coal-measures; a fossil plant of the coal measures, apparently a spike of flowers.

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ANTHOLOGY, n. *ăn-thŏl'ŏ-jĭ* [Gr. *anthos*, a flower; *logos*, discourse]: a discourse on flowers; a collection or selection of flowers of literature, as of poetry or epigrams. **AN'THO-LOG'ICAL**, a. pert. to. Anthology is the title usually given to a book consisting of an unconnected series of choice thoughts, in prose or verse, generally the latter. Of the collections of this kind made in ancient times, which consisted mostly of epigrammatic poems, the best known are the

Greek Anthologies.—The first Greek A. was compiled by Meleager of Gadara, Syria, about B.C. 60. Three or four others belonging to periods considerably subsequent to the birth of Christ are lost. Now extant are two later collections, one by Constantine Cephalas, 10th c., who borrowed largely from one of the earlier anthologies; and another by Maximus Planudes, a monk of Constantinople, 14th c., who, by his tasteless selection from the A. of Cephalas, rather spoiled than increased the already existing store. The A. of Planudes was first issued in print, Florence, 1494, by a learned Greek, John Lascaris, and for a long time was the only one known. It went through successive editions, and received various improvements. The latest edition (with the Latin version of Grotius, a master-piece of latinity and rapid execution) was commenced by Bosch, 1795, and finished by Lennep, 1823. Meanwhile, Claude Salmasius had discovered in the Heidelberg Library (1606) the only extant manuscript of the older and richer A. of Constantine Cephalas, which he compared with that of Planudes, copying out the poems not found in the latter. During the Thirty Years' War, the Heidelberg manuscript was carried to Rome; but in 1797, after the peace of Tolentino, the French secured possession of it, and brought it to Paris. In 1816, it was returned to Heidelberg. After the important discovery of Salmasius, the work was often mentioned by the name of the Palatinate Manuscript, or the Vaticano-Palatinate. Portions of it were published by Jensius, Leich, Reiske, and Klotz. The entire collection, augmented by fragments of the older poets, and by epigrams found on monuments and in other works, was edited by Brunck, Strasburg, 1776, under the title *Analecta Veterum Poëtarum Græcorum* (Selections from the Old Greek Poets), and later by Jacobs, under the title of *Anthologia Græca, sive Poëtarum Græcorum Lusus ex Recensione Brunckii* (Greek A., or Fugitive Pieces of the Greek Poets, from the Corrected Text of Brunck), 1794–1814, Leipsic. Since then, it has been published variously, in whole or part. It is impossible not to admire these gems. There is a rich variety of poetic life, great delicacy of sentiment, a joyous serenity, and an abundance of wise, true, and humane thoughts. To the poet, it presents graceful images and exquisite conceptions; to the philosopher, maxims of wisdom; to the historian, monumental inscriptions; to the philologist, the most varied forms of an imperishable language.

Latin Anthologies.—In 1573. Scaliger published at Leyden, in imitation of the Greek A., a Latin A., under the title *Catalecta Veterum Poëtarum* (Gatherings from the Old Poets), and Pitthŏus one at Paris. 1590. A larger collection

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was issued at Amsterdam (1759 and 1773) by Peter Burmann the Younger, under the title *Anthologia Veterum Latinorum Epigrammatum et Poëmatum* (A. of Old Latin Epigrams and Poems), a more correct and better-arranged edition of which was published by Meyer, 1835.

Asiatic literature is extremely rich in anthologies, which consist sometimes of extracts from the best poets, arranged according to the subject, and sometimes of 'beauties' of their best poets, with biographical notices, in an order either chronological, or according to the countries in which the authors lived.

1. *Arabic Anthologies.*—Abu-Teman published selections from the old Arabic songs before the time of Mohammed, arranged them in ten books, and named the entire collection after the first book, which consisted of war-songs, *Hamâsa.* Another famous A. is the *Divan* of the Hudhailites (an Arabic tribe), an edition of which was published by Kosegarten. Abu'l-Faraj of Ispahan (d. 966) gathered together in his *Kitâb al-aghâni* (Book of Songs), all the ancient Arabic songs down to the first centuries of the Caliphate. It was published by Kosegarten in 1840. Abu'l-Faraj accompanied the work with a minute commentary, which makes it one of the most interesting of the old Arabic literature. But the richest and most complete A. of the later Arabic poesy is *Yatimat al-dahr* (the Pearl of the World), by Taalebi, in which the writers are arranged according to the provinces in which they lived. It has been continued and enlarged since the period of the original compiler. Besides these and similar national anthologies, collections have been made in almost every province where the Arabic culture and speech prevailed. Such, for example, are the numerous Arabico-Spanish ones, though these are little known.

2. *Persian Anthologies.*—In the Persian literature, the best known works of this sort are *Taskarat al Shuara* (Lives of the Poets), by Daulet Shah (d. 1495), the contents of which are to be found almost entire in Hammer's work on Persian *belles-lettres* (Vienna, 1818), and *Atesh Kedah* (the Fire Temple), by Haje-Lutf-Ali-Beg, who lived about 1770. Both works give biographical notices of the Persian poets: the first, in chronological order; the second, in topographical order, with specimens from their works. An A. of the best Persian poetry, arranged according to the subjects, is given in the *Medshua al Shuara* (a Collection of Poets).

3. *Tatar Anthologies.*—Of the poets who have written in the Tatar—i.e., the East Turkish or Tshagatai dialect—we possess a collection comprising 441 biographies, with specimens of their poetry: *Madshalis alnasais* (Charming Company), by Mir-Alischir (d. 1500), and the *Lives of the Tatar Poets*, by Sadiki, extending down to the 17th c.

4. *Turkish Anthologies.*—The number of anthologies in the West Turkish, generally called the Turkish language, is very numerous. The most famous are—*Hesht Behesht* (the Eight Paradises), by Sehi of Adrianople (d. 1548); *Taskarat al Shuara* (Lives of the Poets), by Latifi (d. 1582), and, under the same title, a similar work of Ashik Tshelebi

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(d. 1571); and the great collection, *Subdat al-ashaar* (the Blossoms of Poetry), by Kassade (d. 1621). The substance of these anthologies is to be found in Hammer's *History of West Turkish Poetry* (Pesth, 1836).

5. *Indian Anthologies.*—The literature of the Mohammedan population of Hindustan, which is a mere copy of Persian literature, has also several anthologies. The most important are—*Gulzari Ibrahim*, by Ali Ibrahim, containing biographical notices of 300 Hindustani poets, with specimens of their writings; the collection called *Diwani Iihan*, by Beni-Narâyan; *Guldastai Nishât* (Garland of Pleasure), by Manu Lal (Calcutta, 1836); and *Guldastai Nâzninân*, by Kerim-ed-din (Calcutta, 1845). The substance of these works is to be found in Garcin de Tassy's *Histoire de la Littérature Hindui et Hindustani* (Paris, 1839–47), which, under the title of *Tabakâti Shuarâi Hindi*, was translated into Hindustani by Kerim-ed-din (Delhi, 1848). In the pure Hindi, we have a rich collection of songs, the *Râgd Sâgar*, by Krishnânanda (Calcutta, 1845).

6. *Sanscrit Anthologies.*—The Sanscrit literature is not so rich in anthologies as the other oriental literatures. If we do not consider the Vedic hymns, and the collections of poems which bear the general title *Sataka* (A Century), anthological in the proper sense, there is only one work of this kind known—viz., the *Paddhati*, by Sarngadhara, towards the close of the 14th c., in which are gathered together 6,000 detached strophes of the most famous epic, lyric, and dramatic poets of India, arranged under certain heads.

7. *Chinese Anthologies.*—From the earliest ages, the Chinese had the custom of sending, with the yearly tribute to the emperor, copies of such songs as had acquired popularity. Confucius selected from a great number of these 311 of the most beautiful. These are preserved under the name *Shi-king* (Book of Songs), one of the canonical books of the Chinese. This is the oldest A. in the world. A Latin version, by Lacharme, was pub. Stuttgart, 1830; a German one, by Rückert, Altona, 1833. Besides this, there is *Tchao-ming-wen-siouen*, a collection of the finest poems of the time of the Liang dynasty (A.D. 502–556), and also *Thang-shi*, poems of the time of the Thang dynasty (618–914).

ANTHON, *ăn'thon*, CHARLES, LL.D: 1797–1867, Jul. 29; b. New York: well-known editor of classics. He graduated from Columbia Coll. at the age of 18, studied law in his brother's office, and was admitted to the bar of the Supreme Court of N. Y., 1819. His time, however, was given chiefly to classical literature; and in 1820 he was appointed adjunct Prof. of Languages in Columbia Coll., which office he held for 15 years. His series of classical publications did much to make available for popular purposes the erudite researches of European scholars. His first work was a new edition of Lempriere's *Classical Dictionary*, almost immediately re-issued in England. In 1830, appeared his larger edition of Horace, quite a novelty, on account of the superabundant English notes which accompanied the text. In 1833, he issued a smaller edition, for the use of schools and

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colleges. Virgil, Cæsar, and other ancient writers have been illustrated in the same attractive manner. A.'s editions of the classics have been very popular, but scholars regard them with a kind of learned aversion, both because of the temptations which they present to the learner to overlook the difficulties of a knotty passage, and of the superfluous and often unimportant matter dignified with the title of 'commentary' or 'notes.' However, these works have given a healthy stimulus to the rudimentary study of the ancient authors. In 1831, A. received the degree of LL.D. from his Alma Mater. In 1835, he succeeded Prof. Moore in the chair of languages. A. likewise published large works on ancient geography, Greek and Roman antiquities, mythology, literature, etc.

ANTHON, JOHN, LL.D.: lawyer: 1784, May 14—1863, Mar. 5; b. Detroit; brother of CHARLES A. He graduated at Columbia College 1801, was admitted to the bar 1805, became a founder and pres. of the New York Law Institute, and published *Anthon's Law Student* and *American Precedents* (1810), and other works.

ANTHONY, *ăn'tho-nĭ*, HENRY BOWEN: 1815, Apr. 1—1884, Sep. 2; b. Coventry, R. I.: statesman. He graduated at Brown Univ. 1833, edited the *Providence Journal* 1838–59, was gov. of R. I., 1849–51, and U. S. senator from 1859 till his death, serving on the committees on claims, naval affairs, mines and mining, and post-offices and post-roads.

ANTHONY, JOHN GOULD: 1804, May 17—1877, Oct. 16; b. Providence, R. I.: naturalist. He received a limited education, was engaged in commercial business Cincinnati 35 years, applied himself closely to the study of natural history from boyhood, accompanied Prof. Agassiz on the Thayer expedition to Brazil, 1865, and was in charge of the conchological dept. of the museum of comparative zoology from 1863 till his death.

ANTHONY, SAINT: see ANTONY, SAINT.

ANTHONY, SUSAN BROWNELL: reformer: b. South Adams, Mass., 1820, Feb. 15. She was educated in a Friends' school, taught school in N. Y. 1835–50, began speaking in public 1847, aided in organizing the woman's N. Y. State Temperance Soc. 1852, became a leader in the anti-slavery movement 1857, and began advocating the coeducation of the sexes 1858. Since 1854 she has directed her energies to promoting the cause of woman's suffrage, and 1868 began publishing *The Revolutionist* in aid of the movement. In 1870–80, she lectured in all the n. and several of the s. states, and 1881 in conjunction with Elizabeth Cady Stanton and Matilda Joslyn Gage published *The History of Woman Suffrage* in two volumes.

ANTHONY, WILLIAM ARNOLD: physicist: b. Coventry, R. I., 1835, Nov. 17. He graduated at the Sheffield Scientific School (Yale) 1860; taught the sciences at E. Greenwich, R. I., 1860–61, Franklin, N. Y., 1863–67, Antioch College 1867–70, and the Io. Agricultural College 1870–72; and was prof. of physics in Cornell Univ.

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1872–87. He has designed and constructed a number of important electrical apparatus, and contributed numerous papers to the American Assoc. for the Adv. of Science and the American Institute of Electrical Engineers, of both of which he is a member, and to several electrical and scientific publications.

ANTHONY'S FIRE, *ăn'to-nĭz*, ST.: erysipelas (q.v.): see ANTONY, SAINT.

ANTHONY'S NOSE: (1) in Montgomery co., N. Y., on the n. branch of the Mohawk river, on the extremity of the hill or mountain called the Klips (rock or cliff); slopes from an elevation of about 500 ft. toward the river, and when viewed from the river at the n. entrance to the Highlands resembles a nose 300–400 ft. long; (2) bold promontory on the e. side of the Hudson river in Putnam co., N. Y., projecting from the s. side of Breakneck Hill, opposite the site of old Fort Montgomery, near the s. entrance to the Highlands, below West Point.

ANTHOPHORE, *n.* *ăn'thō-fōr* [Gr. *anthos*, a flower; *pho'rĕō*, I carry]: in *bot.*, a stalk supporting the inner floral envelopes, and separating them from the calyx.

ANTHOPHYLITE, n. *ăn'thō-fĭl'īt* [Gr. *anthos*, a flower; *phullon*, a leaf]: a variety of hornblende of a gray or clove-brown color, so named from the resemblance of its color to that of the *anthophyllum* or clove; it is sometimes green.

ANTHOTAXIS, n. *ăn'thō-tăks'ĭs* [Gr. *anthos*, a flower; *taxis*, arrangement]: in *bot.*, inflorescence.

ANTHOXANTHUM: see VERNAL GRASS

ANTHRACENE, n. *ăn'thra-sēn*, or AN'THRACIN, n. *-sĭn* [Gr. *anthrax*, or *anthrăka*, burning coal]: a solid, crystalline hydrocarbon ($C_{14}H_{10}$) obtained from coal-tar. See ALIZARENE.

ANTHRACITE, n. *ăn'thră-sīt* [Gr. *anthrax* or *anthrăka*, burning coal]: a hard shining coal that burns without smoke or flame. ANTHRACONITE, n. *ăn-thrăk'ō-nīt*, a term applied to those varieties of marble which have a coal-black lustre when polished. AN'THRACIT'IC, a. *-sĭt'ĭk*, pertaining to.

ANTHRACITE: hard coal; a mineral substance of the nature of coal; consisting of carbon with a minimum amount of hydrogen. It is of a black color, conchoidal fracture, and imperfectly metallic lustre (hence called *glance*-coal). It burns slowly, and mostly without flame, and hence is sometimes called *blind*-coal. Its vegetable origin cannot be doubted. Where strata of common coal have been broken through by trap-dikes, the coal next the trap is found to be A., with a gradual transition into the softer state; hence geologists regard A. as debituminized coal; it occurs where rocks have been altered by heat from disturbance. Extensive mines of A. are in e. Penn., whence is derived most of the fuel used in the states of the Atlantic seaboard for manufacturing and domestic purposes. See COAL: CARBONIFEROUS SYSTEM.

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ANTHRACOSAURUS, n. *ăn'thră-kō-saw'rŭs* [Gr. *anthrax*, coal; *sauros*, a lizard]: a large fossil saurian occurring in the coal-measures of Britain.

ANTHRACOTHERIUM, n. *ăn'thră-kō-thē'rĭ-ŭm* [Gr. *anthrax*, coal; *thērĭon*, a wild beast]: a fossil thick-skinned animal of the hippopotamus kind, found among the lignites.

ANTHRAKERPETON, n. *ăn'thră-kĕr'pĕ-tŏn* [Gr. *anthrax*, coal; *herpĕton*, a reptile]: a genus of fossil reptiles of a primitive air-breathing type.

ANTHRAX, n. *ăn'thrăks* [Gr. *anthrax* or *anthrăka*, burning coal]: a carbuncle; a local suppuration which may be idiopathic, or may accompany other diseases as diabetes, or malignant fevers such as the plague, etc.—common also in lower animals. See SPLENIC FEVER: CATTLE-PLAGUE. ANTHRACOID, a. *ăn'thră-koyd* [Gr. *eidos*, resemblance]: pertaining to or resembling an anthrax or carbuncle.

ANTHROPOGRAPHY, n. *ăn'thrō-pŏg'ră-fĭ* [Gr. *anthrōpos*, a man; *graphē*, a writing]: that branch of physical geography which treats of the distribution of the races of mankind. ANTHROPOID, a. *ăn'thrō-poid* [Gr. *eidos*, resemblance]: applied to those species of the monkey which most nearly approach the human form. ANTHROPOLITE, n. *ăn-thrŏp'ŏ-līt* [Gr. *lithos*, a stone]: a petrifaction of the human body, or a part of it. ANTHROPOLOGY, n. *ăn'thrō-pŏl'ŏ-jĭ* [Gr. *logos*, discourse]: the natural history of the human species; the science that has man for its subject. It includes Anatomy, Physiology, Psychology, Ethnology, History, Sociology, Theology, Æsthetics, etc.: see these titles: also ANTHROPOLOGY, and the references. ANTHROPOLOG'ICAL, a. *-pō-lŏj'ĭ-kăl*, pertaining to. AN'THROPOL'OGIST, n. *-o-jist*, one skilled in the knowledge of the natural history of mankind.

ANTHROPOLATRY, n. *ăn'thrō-pŏl'ă-trĭ* [Gr. *anthrōpos*, a man; *latreia*, worship]: the worship given to a human being; a term employed in reproach. Thus, the early Christians accused the heathens of A., because, in their mythology, men were represented as exalted among the gods, although an *apotheosis* (q.v.) was in these cases alleged by their worshippers; and the heathens retorted the charge because of the worship of Christ; the reply to which was the assertion of his oneness with God. But the term is chiefly known in ecclesiastical history in connection with the employment of it by the Apollinarians (q.v.) against the orthodox Christians of the 4th and 5th c. with reference to the doctrine of the perfect human nature of Christ.

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ANTHROPOLOGY, *ăn'thrō·pŏl' ō·jĭ* [Gr. *anthropos*, man; *logos*, discourse]: science of man; his natural history, including his entire nature and development. A. is not an exclusive science, but includes all the sciences in their reference to Man: for instances, see MAN: ETHNOLOGY: COSMOGONY: GOVERNMENT: PHILOLOGY: ANATOMY: PHYSIOLOGY: PSYCHOLOGY: INSTINCT: EMOTION: SENSATION: INTELLECT: WILL: SOUL: RELIGION: ETHICS: ETC.

In the division of A. relating to Man's origin and his place in nature, the Evolution theory is now prevalent among scientific men: see DESCENT OF MAN: DEVELOPMENT OF THE EMBRYO: DARWINIAN THEORY: SPECIES: ETC. A modification of this view by Alfred Russel Wallace, *Darwinism, an Exposition of the Theory of Natural Selection* (1889), is here noted—with additional remarks in general.—Treating of the principle of continuity, relied upon for the derivation of man's entire nature from the brute, he says: 'Because man's physical structure has been developed from an animal form by natural selection, it does not necessarily follow that his mental nature, even though developed *pari passu* with it, has been developed by the same causes only.' According to the early teaching of Lyell, certain causes were held to be amply sufficient to account for geological phenomena. But, in the demonstration of a glacial epoch, a new and altogether distinct cause of many phenomena, producing new effects late in the earth's history, yet continuous with preceding effects, is apparent. Applying this illustration to man's intellectual and moral nature, Wallace goes on to show that certain definite portions of this could not have been developed by variation and natural selection alone, and that, therefore, some other influence, law, or agency is required; and we may justly assume that the same unknown cause has profoundly affected man's whole development. The mathematical faculty, rudimentary in savages, and amazingly developed only in the last three centuries among civilized nations, shows that the Darwinian theory of useful variations, in the struggle of existence, cannot account for the origin and increase of all the faculties of mind, as it does for those of the body. So with music: the Romans and Greeks knew nothing of harmony and the essential features of modern music; only since the 15th century has it been marvellously developed; and it seems to be latent, having had nothing to do with the battle of life, in the lower races, who now, under training, can perform creditably the best modern music. The pictorial and plastic arts have appeared here and there, in their glory, and have not helped the struggle of man with man and his environment. Moreover, while among animals the range of variation is about from 80 to 120, taking the mean to be 100, the difference of capacity among men, in mathematics and art, is enormous; and the capacity often appears suddenly in a family. Similar facts pertain to the faculties of metaphysical speculation and of wit and humor. The inference is that we

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must recognize in these special faculties, thus manifested, an origin wholly distinct from that of animal characteristics—something which we may best refer to a spiritual essence or nature. And thus we may further understand much that is otherwise unintelligible—the constancy of the martyr, the unselfishness of the philanthropist, the devotion of the patriot, as well as the love of truth, the delight in beauty, the passion for justice, the admiration for courageous self-sacrifice—all that pertains to a higher principle than that of animality. If it be objected that the admitted continuity of man's progress from the brute does not admit of new causes or exhibit any sudden change, it may be answered that at three points some new cause or power must necessarily have come into action: first, at the change from inorganic to organic; second, at the introduction of sensation or consciousness; third, at the beginning of the existence in man of his most characteristic and noble faculties—none of these explainable by any increasing complexity of structure. These three distinct stages of progress point clearly to an unseen universe, with its inflowing forces, and to the world as a consistent whole, adapted to the development of spiritual beings. It may be added that Wallace (who shares with Darwin the credit of the theory of the derivation of species by natural selection) has in previous writings contended that the brain and hand of ape and savage are already developed far beyond any needs of a wild life, as shown by the adaptability of these organs to the highest uses of mind and civilization; thus there was a Divine prophecy and preparation looking to man in his utmost exaltation.

In regard to the alleged germs of moral and religious sense in animals below man, nothing has been adduced that is philosophical and decisive. In respect to a *reasoning power*, it should be remarked that a mental process resembling this is common to both men and animals—namely, thinking by images, and the suggestion of one thing by another that is similar, without any necessary noting, abstraction, and comparison of attributes, and followed by associated impulses. Sensation, and the association of sensations present or remembered, were regarded by the general school of cerebralists as sufficient to explain all intellectual processes, until the new comparative psychology sought to find something higher in animals. Reasoning, in its high and proper sense, as the noting of a similar quality by comparison, abstracting it, generalizing it, and affirming it as standing in a fixed or universal relation to another quality—in short, as dealing with concepts, or abstract general conceptions—is distinctive of man. G. J. Romanes, the literary executor of Darwin, is the latest and ablest advocate of reason in animals, but he admits (*Contemporary Review*, vol. iv.) that the higher cognitive powers all are resolvable into abstraction; Huxley resolves ratiocination into predication; and both John Stuart Mill and his father show that this implies not only the recognition

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of relations, but of these as true. All this is implied in noting similarities—that is, in notion, in concept, in thought taken in its distinctive sense. An animal, then, must have all the elements of reasoning proper or none. It is the applying of abstractions to successive objects of sense or of thought, and the linking of abstractions as fixed or inherent. Quality cannot be regarded as such except in and for all the processes and uses of reason. As to the apparent analogy between acts of animals and the reasonable procedure of men, instinct and impulsive association are unquestionably the ruling fact in animals, and we are to incline to these explanations where there is room for doubt. The strongly marked cases of quasi-reasoning are certainly exceptional, unlike the reasoning of man, and they may be presumably accidental, as indeed are some of the seemingly wisest achievements of man. Animals have a superhuman quickness and permanence of sense associations, and the only wonder is, therefore, that wonderful instances of their so-called sagacity are not more common; and this endowment it is that makes reasonable the Darwinian theory of the building up of instincts by the preservation of useful variations of act. At the same time, with marvellous perfection of senses, brutes blunder in perception to a degree in which they should not, if reason accompanied this remarkable perfection; they are easily deceived. It is admitted that acts analogous to those of human intelligence are observable in the three lower subkingdoms of animals; yet no one would claim that reason is present there. Besides, the quasi-reasoning is confined to the narrow lines of subsistence, attack and defense, or mere play-impulse, in all which we should expect that the explanation now given would be sufficent. Reason, as we know it in man, is at first zero, and long and slow in development; whatever the mental outfit of the lower orders may be, it does not include such an element. The quasi-reasoning hardly advances in the individual for life and in the species for ages—the instances of progress gathered being poor and rare. The theory of rationality in brutes involves so high processes of thought as to be incredible, and there is no evidence of any language of abstractions, of concepts, which are the staple of human speech; moreover, the character of all of man's mental powers is so changed by self-consciousness that the analogy fails. In regard to comparative anatomy, the latest doctrine is that the size and complexity of the brain are related to all the activities of its possessor; this accounts for much similarity of brain between men and animals, with dissimilarity of mind. At the same time, there is no high manifestation of intelligence without high brain; and, below man, the brain rapidly diminishes, until it in effect disappears below vertebrates. Gegenbaur repeatedly says and illustrates that the modifications of the supra-esophageal ganglia of invertebrates are in connection with and dependent on the sense-organs. (See Henry W.

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Parker's *Spirit of Beauty*, chap. ii. 'Mind in Animals.' For an example of the sudden and lasting linking of sensation and impulse, see *Revue Scientifique*, 1889, May 4, art. *Formation d'un instinct parmi des animaux vivant en société.*)

The *antiquity of man* has been much revised of late, by scientific men. The relics found in the valley of the Somme, France, by M. Boucher de Perthes, are always quoted; but the examination of the locality by Dr. E. Andrews (see *Amer. Jour. Sci.*, vol. xlv., 2d series) seems to be overlooked. In the 20 ft. of gravel that yielded flint implements, he found evidence of very rapid deposition; the overlying layers of clay had broken down into large cavities that must have been formed by drifting blocks of ice, ultimately melted; besides, there were angular masses of soft chalk and bowlders of sandstone of a ton's weight, both evidently brought by ice; and the whole was not true glacial drift, but indicated river floods—quite inconsistent with De Perthes's slow annual deposit and Sir J. Lubbock's opinion that it was the extremely slow work of untold ages. Above the gravel are 26 ft. of peat, estimated by De Perthes as formed at the rate of an inch or two a century, the total amounting to 15,000 to 20,000 years; but it proved to be forest peat, containing upright, very perishable trunks of birch, rooted in place. On the suppositions of De Perthes, some of these trunks, over 8 ft. high, must have stood undecayed 2,000 to 2,600 years before they were covered, which is incredible. Roman remains at the depth of 6 ft. (after adding 6 or 7 centuries since the deposit ceased) indicated about 5,800 years since the beginning of the bed of peat. Dr. Andrews also visited the gravel half-cones formed against a precipice by the Tinière torrent, near Villeneuve, at the eastern end of Lake Geneva. A railway cut across the lower cone, exhibiting 4 ft. with Roman relics, underlaid by 10 ft. of the bronze age and 19 of the stone age, seemed to give positive data for Morlot's estimate of 96,000 to 143,000 years for both cones. But he had simply divided the radius of the cones by the present annual depth of deposit, instead of estimating the cubic ft. of this, spread over a large surface, and using it as divisor for the cubic contents of the whole—the quotient being nearly 5,000 years for the lower cone. Moreover, the upper cone and the gorge above it revealed abundant signs of great flood action, like those of the gravel in the valley of the Somme. From the beaches of Lake Michigan, Dr. Andrews derives 5,300 to 7,500 years since the erosions and deposits there began (*Amer. Jour. Sci.*, vol. i., 2d series); and his conclusions are accepted by the expert Prof. George F. Wright, 1889. The most remarkable reversal of former judgments is in the case of Niagara Falls as a chronometer of geological time—important because the formation of the gorge, especially its lower portion, began at the end of the ice age, which epoch, thus far, gives the only trustworthy evidence of the appearance of man. Lyell estimated the recession of the

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Falls from Queenstown as occupying 35,000 years. Desor made it a hundred times more—3,500,000 years. But an accurate trigonometrical survey, with map, was made 1842, by direction of Prof. Hall; and from this and the present line of the cataract, G. K. Gilbert of the U. S. Geol. Survey computes the maximum length of time since the birth of the Falls to be 7,000 years, 'and even this small measure may need significant reduction.' Similar results have been reached by Prof. W. H. Winchell in regard to the recession of the Falls of St. Anthony, since the river occupied an old pre-glacial bed, from above the Falls to near Fort Snelling (see *Geol. Survey of Minn.*, 1882–85); also by Prof. Wright, from examination of the gorges of tributaries to Lake Erie, and from a discussion of valley excavations, the small filling of lakes and 'kettle-holes' dating from the ice age, the comparative freshness and unchanged species of organic remains in glacial deposits, and the desiccation of lakes in the Rocky Mountain plateau (see *The Ice Age in North America, and its Bearings on the Antiquity of Man*, by Prof. George F. Wright of the U. S. Geol. Survey, 1889). The famous 'Calaveras skull' and other findings in old river-beds, under the lava deposits of California, are still quoted often—referred by Prof. J. D. Whitney to the Pleiocene or even the Miocene age. Prof. W. Boyd Dawkins says that the auriferous gravels offer no trustworthy evidence upon the question, and that the human remains belong to the ancestors of the present native tribes; and Prof. Le Conte (*Elements of Geology*) remarks that there is doubt as to the age and authenticity of the finds and the undisturbed condition of the gravels, and that the remains are not paleolithic, but neolithic. Even the findings in the valley of the Somme are assailed by some geologists (see remarks by T. K. Callard, F.G.S., in *Trans. Victoria Institute*, vol. xvii.). Dr. Carpenter found that the human jaw discovered there was an imposition. The pottery found by Leonard Horner in the alluvium of the Nile, 30 ft. 4 in. below the surface, and on which he based an estimate of 13,700 years, is of no further account, since Roman pottery has been found there at lower depths. Brydone, from seven alternating strata of lava and soil on Mt. Etna, deduced 14,000 years; however, six similar strata were found over Herculaneum. Much has been made of astronomical calculations; on these Croll put the beginning of the glacial period 240,000 years ago, and its end 70,000; but if the amount of the sun's heat, rather than the condition of the atmosphere, determined the temperature, the difference between the mean annual temperature at the equator and that of the 67th parallel should be 172 degrees instead of 75, as it really is. Astronomers (see Newcomb's *Popular Astronomy*) now tend to diminish geological time.

The *unity of the human race* is not now questioned, since it is found that the races differ less from each other than groups of animals, to whom a common origin is attributed, differ among themselves; and the tests accept-

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ed for animals hold good among men even of the remotest affinities. The permanence of human types since the remotest historical times, in connection with the geologically recent appearance of man, is a great difficulty, but only on the supposition that variations must have always been slowly accumulative. In the strongly marked Hebrew race, there is a type that may have been originated and fixed in one family, that of Abraham, within the historic period; and, more remotely, other families, with more marked, even very abnormal, differences, may have been as sequestered by circumstances as the Hebrew by religion, and have given rise to tribes and nations. The greatest difficulty is the fundamental unlikeness in the grammatical structure of certain languages. It does not seem to have been considered that fragments of the human race may, in more ways than one, have lost language, or lost an early rude stage of its structure, and built up new syntax and inflections, and even a monosyllabic form like the Chinese—a supposition the more admissible since more than one instance is known of isolated children originating a language of their own. As to differences of mere vocabularies, these are illustrated among even neighboring tribes of N. Amer. Indians, who are none the less of the same stock.

For the *classifications of the human race*, see ETHNOLOGY.

The *history of the progress of man* begins with a stone age, which, however, has been continued to our times in some of the ruder tribes. There was first the paleolithic period, when implements were rudely fashioned from stone, followed by the neolithic, with its more varied, better shaped, and polished forms, and with some rare evidences of pictorial embellishment. Next came the bronze age, exhibiting higher art. Of the lowest savages now living, the Australians and some of the S. Amer. Indians are examples. Yet they are a long way from absolute savagery, having skilfully wrought weapons, defenses, and tools of a various industry; they manufacture boats, nets, mats, and baskets, and ornament their work; they cook their food; they recognize family duty, and they have their religious beliefs. This condition, in its material aspects, certainly does not represent the most primitive, which has its ideal in the first parents of the Adamic race, who were beginning to name things, were ignorant of good and evil, lived on fruits, and had to invent clothing. Above the present lowest stage comes the pasturing of flocks, the introduction of agriculture, the manufacture of pottery, and attempts at picture-writing, exhibited more or less by N. Amer. Indians, some of whom, as tribes on the n.w. coast, are skilful in sculpture; and others, like the Zunis, build permanent habitations. It is fair to infer that these existing gradations represent the prehistoric progress of which, in the nature of the case, no record survives other than a few relics. All the present civilizations may be traced back to rude beginnings. The

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great steps of progress were the passage from a wandering life to a fixed and agricultural system, the working of metals, and the invention of something equivalent to writing; also the concentration of energy by a government less simple than the patriarchal. The early development of special arts, also of religious beliefs and ceremonies, offers a wide field for the imagination of the theorist: and it is reasonable to infer that the grand piano originated in the twang of a bow-string; but the infinite expressiveness of music and of man's susceptibility to it cannot, therefore, be resolved into a twang of dried sinew. Dreams of the dead might be conceived of as having first awakened a spiritual faculty, and offerings or other ceremonies in honor of the dead as having been prompted by reverence; but religion is not, therefore, made up of dreams and ceremonies. Coming down to later historic times, anthropology includes the interesting history of the development of all that concerns man. Of this there is no room for an outline in any sketch of anthropology. The earth, as adapted to the several stages of man's progress (see Guyot's *Earth and Man*) and as provided with materials for it—illustrated in geology and natural theology—also as modified by man and modifying his history (see *The Earth as Modified by Human Action*, George P. Marsh, and Buckle's *Hist. of Civilization*), should fill an important place in the science of man. Consult, further, Whately's *Essay on the Origin of Civilization*, Tylor's *Researches into the Hist. of Mankind*, *Primitive Culture*, *Anthropology, an Introduction to the Study of Man and Civilization*, and Sir J. W. Dawson's *Story of the Earth and Man*.

ANTHROPOMETRY, n. *ăn'thrō-pŏm'ĕ-trĭ* [Gr. *anthrōpos*, a man; *metron*, a measure]: the systematic examination of the heights, weights, etc., of human beings; the art of measuring the remains of past races of men with the view of comparing different races. The art has lately been applied with remarkable results to the identification of criminals, previously very minutely measured in detail, as well as in stature, for this purpose. AN'THROPOMET'RIC, a. *-mĕt'rĭk*, pertaining to the art of measuring the human figure, or human remains.

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ANTHROPOMORPHISM, *ăn'thrō-pō-mŏr'fĭzm:* the application, in a figurative way, to God, of terms which properly relate to human beings. Thus, in the Holy Scriptures, we read of the eye, the ear, the arm, the hand of God; and of his remembering, forgetting, etc. This A. appears to arise of necessity from our incapacity of forming conceptions of things spiritual, or finding any terms in which to express them, except by analogies derived from things cognizable by our senses, so that even the language of adoration is borrowed from the familiar things of this world. It is evident that A. employed in an unguarded manner, or too grossly understood, might lead to most serious error; and a tendency has manifested itself at various times in the history of the Christian Church to ascribe to the Divine Being a form and parts like those of men. Thus, the Audæans (q.v.) or Audians, a Syrian monastic sect in the 4th c., were accused, and, it seems, justly, of holding that God was possessed of a human shape, and that, when the Bible said that 'God created man in his own image,' the words are to be understood of this shape literally. The same error was at a later period ascribed to the Waldenses, but there was no evidence of the justice of the accusation. A tendency to A. may indeed be regarded as always existing, and so requiring to be guarded against in the mind of every man; but the instances have been rare and isolated, although they have from time to time occurred, in which anthropomorphite views have been fully adopted and openly expressed among Christians. The error of the anthropomorphites has, however, found countenance from the speculations of philosophers. Hobbes, Forster, and Priestley ascribed to the Divine Being a sort of subtile body. Fichte, on the other hand, rejected the very doctrine of the personality of the Divine Being as anthropomorphic, and represented God as the *moral order of the universe;* and Schelling, Hegel, Feuerbach, and Schleiermacher substituted, or used terms which might be understood as substituting, for the objective personality of God a subjective consciousness of God in the human soul.—The term *Anthropopathism* is sometimes employed to denote the ascription to God of human affections and passions, although A., in its most general sense, includes this. The language of Scripture, in the many instances of this kind, must be interpreted according to the same general principles which are applicable in those of A. strictly so called, with the same discrimination of the figurative from the literal, and the same constant recognition of the absolute spirituality and unchangeableness of God; yet so that important truths conveyed by means of such language, and which it is probable could only be conveyed to us by such language, in accordance with our mental constitution may not be rejected or obscured.

ANTHROPOMORPHITE, n. *ăn'thrō pō mŏr'fit* [Gr *anthrōpos*, man; *morphē*, form, shape]: one who attributes a human form to the Deity. -MOR'PHISM, n. the doctrine. -MOR'PHOUS, a. pertaining to that which resembles a human form. AN'THROPOMOR'PHIC, a. *-mŏr'fĭk*, of or pertaining to. AN'THROPOMORPHIS'TIC, a. *-tĭk*, having a tendency to attribute a human form to the Deity.

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ANTHROPOPATHISM, n. *ăn'thrō-pŏp'ă-thĭzm* [Gr. *an-thrōpos*, a man; *pathos*, affection or feeling, passion]: the doctrine which ascribes human passions to the Supreme Being. **AN'THROPOPATH'IC**, a. *-pō-păth'ĭk;* or **AN'THROPOPATH'ICAL**, a. *-ĭk-ăl*, pert. to: subject to human passions. **ANTHROPOPATHY**, n. *ăn'thrō-pŏp'ă-thĭ*, human affections or passions as pert. to the Supreme Being.

ANTHROPOPHAGI, n. plu. *ăn'thrō-pŏf'ă-jī* [Gr. *anthrōpos*, a man; *phagein*, to eat]: cannibals; men that eat human flesh. See **CANNIBAL**. **AN'THROPOPHAGIN'IAN**, n. *-ă-jĭn'ĭ-ăn*, a cannibal. **AN'THROPOPH'AGOUS**, a. *-pŏf'ă-gŭs*, feeding on human flesh. **AN'THROPOPH'AGY**, n. *-pŏf'ă-jĭ*, the practice of eating human flesh.

ANTHROPOTOMIST, n. *ăn'thrō-pŏt'ō-mĭst* [Gr. *anthrōpos*, a man; *tomē*, a cutting]: an anatomist of human bodies.

ANTHURIUM, n. *ăn-thū'rĭ-ŭm* [Gr. *anthos*, a flower; *oura*, a tail]: in *bot.*, a genus of plants of the Arum family having their inflorescence in the form of spikes like tails.

ANTHUS, and **ANTHIDÆ**: see **PIPIT**.

ANTHYLLIS: see **KIDNEY VETCH**.

ANTI, *ăn'tī* [Gr.]: a prefix, with its form **ANT**, signifies against or opposite; in place of.

ANTIARIS, and **ANTJAR**: see **UPAS**.

ANTIBES, *ŏn-tēb'* (anciently *Antipolis*): fortified seaport in the dept. of the Alpes Maritimes, in the s.e. of Provence, France; lat. 43° 34′ n., long. 7° 8′ e.; on the e. side of a small neck of land called La-Garoupe, w. from the mouth of the Var; in a fertile district. The harbor is serviceable only for small craft. It is a military station of the third rank, has a naval school, and considerable trade in olives, dried fruits, salt-fish, oil, etc. The anchovies prepared at A. are held in high estimation. The environs of the town are beautifully adorned with gardens, vineyards, and orchards.

A. is a very old place, founded by a colony of Greeks from Massilia (Marseilles), of which it was a dependency. In the time of Augustus it was elevated to the rank of an Italian city, and many ruins still testify to its ancient prosperity. After the wreck of the old Roman empire, A. became subject to successive tribes of barbarians from the north. In the 9th c., it was destroyed by the Saracens; in the 16th c., it was fortified by Francis I. and Henry IV.; during the Austrian War of Succession, it sustained a siege of three months (1746). A. closed its gates against Napoleon on his return from Elba. The *Antibes Legion* was a body of foreign troops, chiefly French, formed at A. kept by the pope during the French occupation at Rome. Pop. (1891) 7,401.

ANTIBILIOUS, a. *ăn'tĭ-bĭl'yŭs* [Gr. *anti*, against, and *bilious*]: good for the cure of bilious complaints.

ANTIBRACHIUM, n. *ănt'ĭ-brăk'ĭ-ŭm* [Gr. *anti*, in front of; Gr. *brachiōn;* L. *brachĭŭm*, the arm]: the fore-arm of the higher vertebrates, composed of the radius and ulna. **ANTIBRACH'IAL**, a. *-ĭ-ăl*, pert. to.

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ANTIC, a. *ăn'tĭk* [F. *antique;* OF. *antif*, ancient—from L. *anti'quus*, old]: odd; fanciful: N. odd appearance; a buffoon; in *arch.*, a grotesque figure used as an ornament. ANTICS, n. plu. odd or extravagant gesticulations; grotesque and foolish actions. ANTICLY, ad. *ăn'tĭk-lĭ*. *Note.*—On the revival of art in the fourteenth and fifteenth centuries the ancient models were imitated in sculpture-work, and the copies called *antiques;* monstrous and caricature representations in sculpture became very common, and known by the same name; hence any grotesque figure in sculpture was called an *antique* or *antic*, figuratively transferred to grotesque contortions of body or conduct.

ANTICHLORE, *ăn'tĭ-klōr:* name given to commercial sodium sulphite by paper-makers. When the rags are reduced to a pulp, they are bleached by chloride of lime (bleaching powder), which thoroughly soaks the pulp, and is very difficult to wash out. The traces of chlorine thus left in the pulp pass into the manufactured paper, and tend to bleach the writing-ink which may be traced thereon. To free the pulp from the residue of the chlorine, some sodium sulphite is employed, and hence the name A., which literally signifies 'against (*anti*) chlorine.'

ANTICHRIST, n. *ăn'tĭ-krīst* [Gr. *anti*, against, and *Christ*]: a false Christ; an antagonist of Christ. AN'TICHRIST'IAN, a. *-krĭst-yăn*, opposing the Christian religion, or opposite to it. The general notion of Antichrist as a power opposing itself to the reign of the Messiah, may be traced back beyond the Christian era. Its origin is perhaps to be found in the prophecy of Ezekel (Ezkl. xxxviii. 2; see also Rev. xx. 8) concerning the doom of Gog and Magog. In accordance with the old saying, 'When need is sorest, help is nearest,' the Jews conceived that, immediately previous to the Messiah's reign, national adversity must be experienced in an extreme degree, and that an agent of Satan would appear, who must be overcome before prosperity could be restored. This agent was A. The idea is adopted in the New Test., although the term A. occurs in no place of Scripture except John I. and II. From such passages as the prophecies of the Saviour, Matt. xxiv. and Mark xiii., it has been inferred by some that probably the great truth which this conception was intended to shadow forth was similar to that illustrated in the life of 'the Man of Sorrows'—that only through tribulation and strife could the reign of the Messiah be established, that Christ's kingdom, like Christ himself, could be made perfect only through suffering. And with this the language of John in his epistles, and of Paul in passages which seem to embody the same idea, is supposed to accord. Nor is it regarded as a fatal objection to this opinion, that in the Apocalypse the Antichristian power or element is associated with the great heathen capital Rome, symbolically designated Babylon.

But this opinion neither has been nor is generally prevalent. The idea of A. early became associated with that of the Millennium (q.v.) retaining a form very similar to that

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which it had among the Jews before the advent of the Messiah; and popular opinion has always sought to find for it some actual and definite embodiment. In the 5th c., a popular delusion prevailed, founded on the passage in the Apocalypse, Rev. xvii. 8, that Nero was not dead and would return in the character of A. After the 16th c., a prevalent opinion among Protestants was that A. is the Rom. Cath. Church; an idea entertained even at an earlier period, as, for instance, by Ludwig of Bavaria, regarding Pope John XXII., by Occam, Wickliffe, and his pupil Cobham, and the Bohemian reformer Janow, and which seems to have prevailed to a considerable extent among the Hussites and other opponents of Rome. This opinion still lingering, but no longer largely advocated among the leaders of Protestant thought, has been powerfully opposed by Roman Catholic writers, as by Bossuet, who, in his comments on the Apocalypse, ably advocates the opinion that Pagan Rome was A. The opinions of Roman Catholics, however, are much divided concerning A., many maintaining that A. is yet to come and 'to raise the last persecution,' as 'no one has yet appeared to whom we can apply the character which the infallible Word of God declares shall be that of the real A.'—*Keenan's Catechism of the Christian Religion.*

The opinion prevalent among Protestants depends upon the identification of A. with the mystical Babylon of the Apocalypse, and with other symbolic representations in that book, of a power opposed to the cause of Christ, and also with the 'Wicked' one, the 'Man of Sin,' and 'Son of Perdition,' 2 Thess. ii. Thus it is still maintained by some that a definite embodiment of the idea of A. is to be sought in history, and that this is to be found in the Church of Rome, or rather in the papal power. And such Protestant advocates refer to the gradual growth and development of the errors which they regard as culminating in the Latin Church, as accordant with the declaration of the apostle Paul, 2. Thess. ii., that 'the mystery of iniquity doth already work,' and with that of John, 'even now are there many antichrists.'

There have been, however, among Protestants even from an early period eminent opponents of this opinion, among whom may be named Grotius. His own opinion was singular, that Caligula, the Roman emperor, was A. In the Greek Church, the term A. has been understood as especially applicable to Mohammed, or to the dominion of the Turks and Saracens. Almost every great or striking event—the arrival of the year 1,000; the beginning of the Crusades; the 'black death' and other plagues in the 14th c.; the career of Napoleon in 1805; and even the political movements of 1848–49—has suggested new interpretations of the passages of Scripture regarding A. See REVELATION OF JOHN.

Hitherto the interpretation of the Scripture texts relating to A. has not been instructive. 'Much error,' says Dr. Samuel Davidson, 'has arisen from mixing up Daniel's vision with those of the Apocalypse, because

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they refer to different subjects. The apostle borrows characteristic features from Daniel's Antiochus Epiphanes, to fill out his picture of Nero. The combination of St. Paul's Man of Sin with St. John's antichristian Nero has also led to misapprehension. The idea is variously developed, according to the mental peculiarities and knowledge of those who entertained it. Vague and general at first, it was afterward narrowed, somewhat in the manner of the Messianic one. Its different forms show that it was no article of faith, no dogma connected with salvation. Less definite in the second epistle to the Thessalonians, it is somewhat specific in the Revelation. . . . The author of John's first epistle gave the idea of Antichrist a spiritual width, consistently with the whole direction of his epistle. In each case, however, the writers moved within their own times, their knowledge bounded by the necessary limits of the human intellect, so that their subjective views can hardly be accepted as the emanations of minds projecting themselves into the future with infallible certainty. What they express about Antichrist is their development of an idea which sprang out of Jewish soil. . . . It is the very individualizing of the A. idea which removes it from the sphere of actual realization.' These views, so far as they regard the Hebrew cast of the prophetic idea of A., and the national horizon which limited the scope of its imagery, are probably shared by the majority of recent biblical scholars. But, when the *personal* element is ruled out, and an abstract A. brought in to fill its place, in the interest of making the prediction more true to nature and to the reality of things, the whole vital force of the idea will, to many, seem to be taken away. Increasingly is it felt that in any great moral conflict the personal element is inevitable.—Compare Davidson's *Introduction to the Study of the New Testament*, I.; Renan's *L'Antéchrist;* Jowett's *Epistles of St. Paul to the Thessalonians*, etc., I.

ANTICHRISTIANISM, *ăn-tĭ-krĭst'yan-ĭzm* [*antichristian*, and *ism*]: belief or conduct opposed to Christianity; opposition to the doctrine of Christ, or of the Christian Church.

ANTICHTHON, *ăn-tĭk'thŏn* [Gr. *anti*, opposite; *chthōn*, earth]: in Pythagorean astronomy, supposititious invisible planet that continually opposes the earth and eclipses the central fire, round which it supposedly revolved. Also, a dweller in an opposite hemisphere.

ANTICIPANT, a. *ăn-tĭs'ĭ-pant* [L. *anticipans*, taking beforehand]: anticipating; in anticipation of: term used of periodic fevers or other diseases in which the paroxysms arrive earlier than their normal period.

ANTICIPATE, v. *ăn-tĭs'ĭ-pāt* [L. *anticĭpātus*, anticipated; *ante*, before; *căpĭō*, I take; F. *anticiper*]: to do or take beforehand; to take first possession; to take before the proper time; to foretaste. ANTIC'IPA'TING, imp. ANTIC'-

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IPA'TED, pp. ANTIC'IPA'TION, n. *-pā'shŭn*, the act of anticipating; prevention. ANTIC'IPA'TOR, n. one who. ANTIC'IPATIVE, a. *-pā-tĭv*, or ANTIC'IPATORY, a. *-pā-tĕr-ĭ*, taking beforehand.—SYN. of 'anticipate:' to prevent; obviate; preclude; expect; preoccupy; foresee; forestall; precede.

ANTICLIMAX, n. *ăn'tĭ-klī'măks* [Gr. *anti*, opposite to; *klimax*, a ladder or staircase]: a figure of speech in which the ideas, instead of successively increasing in grandeur, sink lower.

ANTICLINAL, a. *ăn'tĭ-klī'năl* [Gr. *anti*, against; *klino*, I bend]: in *geol.*, applied to strata which dip in opposite directions in a roof-like form; opposite of *synclinal*.

ANTI-CORN-LAW LEAGUE: an association which concentrated the efforts of the free-trade party in Britain, and enabled them to carry the repeal of the corn-laws, and establish in practice the principle of free-trade. For the results thus accomplished, see CORN-LAWS: FREE-TRADE, etc. Associations to obtain the repeal of the corn-laws existed in several places before the embodiment of the League—one especially was founded in London in 1834. In 1838, Mr. Cobden and others took the opportunity of the periodical assemblages of the Manchester Chamber of Commerce for exposing the deleterious influence of the restrictive commercial policy on the manufactures and trade of the country. The friends of free-trade occasionally met in Manchester to discuss and promulgate their views; but it was in the beginning of 1839 that the strength of the party was first drawn to a focus, by the appointment of delegates from the manufacturing districts to go to London, and press their principles on the legislature. Mr. Charles Villiers, afterwards pres. of the board of trade, undertook the leadership of their cause in the house of commons, of which Mr. Cobden, who subsequently served it so effectively, was not then a member. Feb. 19, Mr. Villiers moved that the house resolve itself into a committee of inquiry on the corn laws; and again Mar. 12, he moved that certain manufacturers be heard by counsel at the bar of the house against the corn-laws, as injurious to their private interest. The former motion was rejected by 342 to 195; the latter, by 361 to 172. Immediately on the return of the delegates from their unsuccessful effort, the League was formed. Its constitution dates from 1839, Mar. 20, when resolutions were adopted, at a meeting in Manchester, for 'the formation of a permanent union, to be called 'The Anti-corn-law League,' composed of all the towns and districts represented in the delegation, and as many others as might be induced to form associations, and to join the League. The central office of the League was established in Manchester, having in charge the influencing of public sentiment by securing competent lecturers, by obtaining the co-operation of the public press, by correspondence with the local associations, and by various other means. The sum of £5,000 was put at the disposal of the central body, in whose deliberations a contribution of £50 entitled the giver to one vote. The League collected and distributed large sums

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of money. Just before its principles became triumphant in the free-trade legislation of 1846, it demanded a quarter of a million pounds, which would have been supplied had it been necessary.

The teachings of the League gained acceptance as presenting a scientific truth in political economy. A majority of the parliament who, in 1841, had been elected for the support of protection, were converted to free-trade, the conversion including the prime minister, Sir Robert Peel. The key-note to the literature of the League was struck by the beautiful logical exposition of free-trade in General Thompson's *Catechism of the Corn-laws*, which, with other tracts, was profusely dispensed over the country. To serve their cause in the same manner, the protectionist party, at a meeting held in the Duke of Somerset's house, 1844, Feb. 17, founded 'The Agricultural Protection Soc. of Great Britain'; but the exertions of this body seem to have helped rather than hindered. See FREE-TRADE: TARIFF.

ANTICOSTI, *ăn'tĭ-kŏs'tĭ:* island in the Gulf of St. Lawrence, with lighthouses at different parts of the coast; between lat. 49° and 50° n., and long. 61° 40′ and 64° 30′ w.: estimated 3,145 sq. m. Neither to the settler nor to the mariner is A. of value. It is destitute of harbors, the n. shore being mountainous, and the s. low and beset by shoals; while, to increase the danger, the neighboring currents are said to be capricious. The climate is severe; while the surface is an alternation of rocks and swamps. There are hardly any inhabitants save lighthouse-keepers and a few officials, about 600 in all. The island, attached to the Canadian prov. of Quebec, has considerable salmon, trout, cod, and herring fisheries, and is a resort for seal and bear hunting. Extensive peat deposits are found in Anticosti. Marl also occurs.

ANTICOUS, a. *ăn'tĭ-kŭs* [L. *anticus*, in front]: in *bot.*, placed in front of a flower, as the lip of orchids.

ANTIDOTE, n. *ăn'tĭ-dōt* [Gr. *antĭd'ŏton*, a remedy—from *anti*, against; *didōnai*, to give]: a medicine to counteract the bad effects of poison; a remedy for any evil. See POISONS. ANTIDOTAL, a. *ăn'tĭ-dō'tăl*, or AN'TIDO'TICAL, a. *-dō'tĭ-kăl*, expelling the effects of poison. AN'TIDO'TALLY, ad. *-tăl-ĭ*. AN'TIDO'TICALLY, ad. *-kăl-lĭ*.

ANTIDROMOUS, a. *ăn-tĭd'rō-mŭs* [Gr. *anti*, opposite to; *dromos*, a course]: running in the opposite direction, as spirals which run alternately in opposite directions; the opposite of *homodromous*.

ANTIETAM, *ăn-tē'tam*, BATTLE OF (Confederate name, SHARPSBURG, BATTLE OF): 1862, Sep. 17, on Antietam creek near Sharpsburg, Md., between the Union army under Gen. McClellan and the Confederate army under Gen. Lee. The strength of the opposing armies has been variously stated. Gen. McClellan reported his own at 87,164, and estimated Gen. Lee's at 97,445; Gen. Lee reported 40,000; the Richmond *Enquirer* credited him with 60,000; and Pollard's *Southern History of the War* estimated the Confederate force at 45,000 in the morning and 75,000 in

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the afternoon. The movements of both armies had been spirited from Sep. 1. On the fourth, fifth, and sixth, Gen. Lee threw his forces across the Potomac near Leesburg, occupied Frederick, and possessed himself of the surrounding country. Gen. McClellan, eager to protect Washington and anxious to prevent a further invasion of Union territory, forced Lee to abandon Frederick on the 12th by interposing a strong force between the Confederates and the fords of the Potomac, Lee moving toward Hagerstown. While McClellan and Lee were watching each other here, a Confederate force under 'Stonewall' Jackson hastened to Harper's Ferry, and compelled its surrender with 12,000, to 13,000 prisoners, Sep. 15. On the 14th McClellan occupied Cramptoris Gap and the heights of South Mountain, commanding the road to Hagerstown, and, a second time checking Lee's advance, forced him to retreat across Antietam creek to Sharpsburg. A portion of the Union army under Gen. Hooker followed in pursuit on the 16th, had a sharp engagement with the Confederates, and gained their object—a favorable position. Early the next morning Hooker forced the battle by attacking the Confederate left, while Gen. Burnside engaged the right. Hooker at first drove the left wing backward to a cornfield bordered by woods, and was bearing the brunt of the fighting when he was wounded and had to be carried from the field. Gen. Sumner then took command at this point, and though twice repulsed at the cornfield, the Union army succeeded in holding the position. On the Union left, Burnside was twice checked in attempting to cross the creek, but in the afternoon drove the Confederates back to a range of hills where several Confederate batteries had been posted. Ordered to secure these hills, he captured the first battery; but by this time Lee had so strengthened the second hill that Burnside reported he could not hold the ground already gained without reinforcements, and as these were not furnished him he was driven back to the bridge. Gen. French, commanding the centre of the Union line, pressed forward steadily toward the hills, but could not gain them; while Gen. Richardson with a div. of Sumner's corps, drove the Confederates from the river nearly to Sharpsburg. Darkness then put an end to the fighting for the day. An armistice to bury their dead was granted the Confederates the next day, and during the night they retreated to the right bank of the Potomac. McClellan reported his loss at 12,469, including 2,010 killed; the Confederates acknowledged a loss of 13,533 in their Md. campaign. McClellan in the campaign took 13 guns, 39 colors, more than 15,000 stand of arms, and more than 6,000 prisoners, without loosing a gun or color.

ANTIFEBRIN, n. *ăn'tĭfĕb'rĭn* [L. *anti*, against; *febris*, fever]: a remedy to abate fever. see ACETANILIDE.

ANTIGONE, *ăn-tĭg'ō-nē:* several characters in Greek legend, (1) daughter of Œdipus by his own mother Jocasta, and sister of Eteocles and Polynices. She accompanied her father into exile, and after his death returned to Thebes. Eteocles, the king, had banished his brother

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Polynices, who, coming back with an army, engaged him in single combat. Both fell, and Creon, who after their death had become tyrant of Thebes, forbade their interment. When he learned that A. had buried Polynices, he shut her up in a tomb or cave where she died. A son of Creon, betrothed to A., killed himself when her fate became known. (See Sophocles's *Œdipus at Colonus* and *Antigone*); (2) daughter of Eurytion, wife of Peleus, who hanged herself on receiving a false report of her husband's marriage to Sterope; (3) daughter of Laomedon and sister of Priam, who audaciously compared her beauty to Juno's, and was punished by having her hair turned into snakes, which so tormented her that the gods in compassion changed her into a stork.

ANTIG'ONUS: name of many historical persons, of which the most celebrated was the son of Philip of Elymiotis, and one of the generals of Alexander the Great: B.C. 381–301. In the division of the empire which followed the death of his master, A. received the provinces of Phrygia-Major, Lycia, and Pamphylia. Being accused of disobedience by Perdiccas, who wished to gain possession of all the territories left by Alexander, A. entered into alliance with Craterus, Antipater, and Ptolemæus, and declared war against Perdiccas, B.C. 321. In the same year, Perdiccas was assassinated by his own soldiers; but A. carried on the war against Eumenes, to whom Perdiccas had given rule over Paphlagonia and Cappadocia. Eumenes, and afterwards Seleucus, who reigned in Syria, were deposed by A., whose ambition and cupidity grew beyond all bounds. He seized the treasures of Alexander kept at Ecbatana and Susa, which he refused to share with his allies, Ptolemæus, Cassander (son of Antipater), and Lysimachus. All the other generals now allied themselves against him, and a long series of contests took place in Syria, Phœnicia, Asia Minor and Greece, which ended with the battle of Ipsus, in Phrygia, when A. was slain in his eighty-first year.

ANTIGONUS GONATAS, *an-tĭg'ō-nŭs gon'ă-tas*: King of Macedonia: reigned B.C. 277–244; d. B.C. 243: son of Demetrius Poliorcetes, king of Macedonia, and grandson of the great Antigonus. On his father's death, B.C. 283, various claimants for the throne appeared, and much confusion ensued, the result of which was that the royal power fell into the hands of Ptolemæus Ceraunus, who soon perished in a battle with the Gauls, when A. G. became ruler of the country (277 B.C.), and governed precariously in that age of intrigue, dissimulation, and violence, for 33 years. He was twice expelled from his dominions by a hostile force from Epirus, but found refuge and assistance in the Peloponnesus. The close of his career was comparatively peaceful.

ANTIGUA, *ăn-tē'ga:* West India island, the most important of the Leeward Islands (see ANTILLES); residence of the gov.-in-chief of the British portion of the group; w. long., between 61° 44′ and 61° 58′; n. lat., between 17° 2′ and 17° 13′. It is about 18 m. across; 108 sq. m. It was first set

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tled, 1632, having till then remained, in fact, uninhabited on account of the great scarcity of fresh water. It has twice suffered severely from earthquakes—1689 and 1843, and of hurricanes, the other heavy scourge of the group, A. has had its full share. Numerous islets, rocks, and shoals border the shore, so that, generally speaking, access is difficult and dangerous. But St. Johns, cap. and chief town, is at the head of a safe and capacious bay, which unfortunately, however, does not admit large vessels. English Harbor is, on the whole, a more commodious port, and has been selected as the station of the Royal Mail steam-packets. It is said to be capable of receiving the largest ships in the British navy.

A. is chiefly of tertiary formation. The s. and w. show grauwacke, porphyry, trap, breccia, amygdaloid, and basaltic greenstone; the n. and e. exhibit calcareous marl and coarse sandstone, interspersed with blocks of limestone; while the interior presents argillaceous strata and irregular beds of coarse flint.

Besides provisions, generally almost sufficient for its own consumption, A. produces large quantities of sugar, molasses, and rum. Total value of imports (1891) $835,550; of exports $787,315

Immediately after the passing of the imperial statute for emancipation of slaves, the local legislature, rejecting the probationary state of apprenticeship, proclaimed unqualified freedom of the 30,000 slaves, for 1834, Aug. 1. Pop. (1891), with Barbuda, 30 m. n., 36,699, of which Barbuda 1,000. There has been small increase since 1871.

ANTIHELIX, n. *ănt'ĭ-hēl'ĭks* [Gr. *anti*, opposite to, but here in the sense of 'before'; *helix*, anything twisted or convoluted, the ear]: the curved prominence parallel with, and in front of, the helix or external prominent rim of the auricle of the ear.

ANTILEGOMENA, *ăn-tĭ-lē-gŏm'ē-na*, n. plu. [Gr. *antilegomena*, things spoken against]: applied especially to certain books in the New Test., which were finally admitted into the canon, though not universally acknowledged in the early church. Such books included the now accepted Epistle to the Hebrews, II. Peter, II. and III. John, the Epistles of James and of Jude, and the Revelation. Rom. Cath. theologians classify these books under one head, calling them *deuterocanonical*, or forming a second canon [from Gr. *deutero*, second]. No New Test. canon is known to have been formed until the latter half of the 2d century.

ANTILLES, *ăn-tĭl'lēz* or *ŏn-tēl'*: term designating generally the whole of the West Indian Islands, except the Bahamas. Generally speaking, they stretch e. from the Gulf of Mexico to about the meridian of the Gulf of Paria; then s. to the Gulf of Paria itself; and lastly, w. to the Gulf of Maracaybo. Primarily, however, they are regarded not as three sections, but as two—the Greater A., to the n. and w.; and the Lesser, to the e. and s. This distinction, which obviously involves considerations of position as well as of

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magnitude, will be found to indicate also a difference of organic structure.

The Greater A., reckoning from the w., are: Cuba (Spanish), Jamaica (British), Hayti (independent), and Porto Rico (Spanish). They extend, in w. long, from 84° 58′ to 65° 40′, and in n. lat. from 23° 9′ to 17° 40′—the higher of these two parallels being only 21′ or about 25 m. within the Tropic of Cancer. On the lowest estimate, the area is 70,000 sq. m. The Greater A. appear to be of primitive formation, presenting lofty granitic mountains. In Jamaica, however, there are many hills of calcareous origin.

The Lesser A. may be divided into two chains—the e., trending round from the e. of Porto Rico to the Gulf of Paria; and the s., stretching away in a direction nearly parallel with that of the Greater A., along the coast of Venezuela as far as the Gulf of Maracaybo. By the Spaniards, followed by some other nations, the latter chain is termed the Leeward Islands, and the former the Windward Islands. In English and French phraseology, however, the Leeward Islands are all those to the n. of 15° n. lat., and the Windward Islands all those s. of that parallel.

In the latter sense of the name, the Leeward Islands, reckoning from the n., come in nearly the following order: Virgin Islands (Danish and British), Anegada (British), Anguilla (British), St. Martin (French and Dutch), St. Croix (Danish), Saba (Dutch), St. Bartholomew (French). St. Eustatius (Dutch), Barbuda (British), St. Christopher's (British), Nevis (British), Antigua (British), Montserrat (British), Deseada (French), Guadeloupe (French), Marie Galante (French), Dominica (British). They extend in w. long. from 65° 30′, at the w. extremity of the Virgin Isles to 61° 28′, at the e. extremity of Dominica; and in n. lat. from 18° 48′, at the n. extremity of Anegada to 15° 10′, at the s. extremity of Dominica; area about 5,000 sq. miles.

The Windward Islands, reckoning from n. to s. and then from e. to w., are as follows: Martinique (French), St. Lucia (British), Barbadoes (British), St. Vincent (British), Grenadines (British), Grenada (British), Tobago (British), Trinidad (British), Testigos (Venezuelan), Margarita (Venezuelan), Tortuga (Venezuelan), Blanquilla (Venezuelan), Buen Ayre (Dutch), Curaçoa (Dutch), Aruba (Dutch). They extend in w. long. from 59° 20′ at the e. of Barbadoes, to 70° 11′, at the w. of Aruba; and in n. lat. from 11°, at the s. of Margarita, to 14° 55′, at the n. of Martinique. Their entire area cannot exceed 1,500 sq. m. The Windward Islands, in the Spanish sense of the term, are otherwise called the Caribbees; and hence the sea which they cut off from the open Atlantic is called the Caribbean Sea (q.v.).

The Lesser A., as a whole, appear to be chiefly of coral formation, or of volcanic origin. Many of them contain extinct craters; and, though not destitute of harbors, their coasts are in a great measure inaccessible by reason of reefs.

The A. generally—but perhaps the Lesser more so than the Greater—are subject to hurricanes and earthquakes. Their principal productions are sugar, rum, cotton, coffee, etc. (see the titles of the individual islands).

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The name A. is generally supposed to have been given by mistake to the West Indian Islands. Before the discovery of America by Columbus, a tradition existed that far to the w. of the Azores there lay land called Antilla, whose position was vaguely indicated in the maps of the early cosmographers. Only eight months after Columbus's return, Peter Martyr writes that the islands which the great navigator had touched upon must be the Antillæ; and it is certain that Cuba and Hayti were known as such before a single link in the Caribbean chain was discovered.

ANTILOPE: see ANTELOPE.

ANTIMONY, n. *ăn'tĭ-mon-ĭ* [mid. L. *antimo'nĭŭm:* F. *antimoine*]: a metallic substance much used as an alloy; the chemical name is *stĭbĭum.* ANTIMONIAL, a. *ăn'tĭ-mō'nĭ-ăl,* pert. to antimony, or containing it: N. the medicine. AN'TIMO'NIATE, n. *-nĭ-āt,* a salt of antimonic acid. AN'TIMO'NIAT'ED, a. *-āt'ĕd,* made of antimony or mixed with it. AN'TIMON'IC, a. *-ĭk,* or AN'TIMO'NIOUS, a. *-nĭ-ŭs,* of antimony: applied to the acids of antimony. ANTIMONITE, n. *ăn'tĭ-mŏn-īt',* a salt of antimonious acid; in *min.*, the sulphuret of antimony which forms the common ore of that metal.

ANTIMONY—symb. *Sb* (Lat. *Stibium*): equiv. 122: a brittle metal of a flaky, crystalline texture, and bluish-white color. It is easily reduced to powder; when heated to 840° F., it fuses, and thereafter being allowed to cool, it solidifies in rhombohedral crystals, which are isomorphous with those of arsenic. Heated in a retort, where the oxygen of the air is excluded, as in an atmosphere of hydrogen, A. volatilizes as the vapor of the pure metal. When raised in temperature in contact with the air, it burns with a white light—combining with the oxygen of the atmosphere, and forming copious white fumes of the teroxide of A., or 'flowers of A.' The metal is a bad conductor of heat and electricity, but may be used, in conjunction with bismuth, in the construction of thermo-electric piles. Exposed to the air at ordinary temperatures, A. does not tarnish or rust; and this property, combined with the hardness of the metal and of its compounds, renders A. of essential service in the useful arts, in the construction of alloys, such as Britannia metal, type metal, and plate pewter. It is likewise employed in the preparation of the large concave mirrors used in astronomical observations; and in the casting of bells, to make them harder and whiter, and to give them a clearer and stronger sound.

A. sesquisulphide (stibnite, or gray A. ore), Sb_2S_3, which is found abundantly in Nevada, Borneo, and New Brunswick, and which is mined also in Hungary, Bohemia, Prussia, and Bavaria, is the principal source of A. It occurs usually in veins, is of leaden gray color, with metallic, sometimes irridescent lustre; it fuses readily. From stibnite metallic A. is obtained by fusion with charcoal that has been saturated with solution of sodium carbonate: or it may be reduced direct by roasting the sulphide with a mixture of cream of tartar and nitre, or with iron filings.

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The raw A., thus or otherwise obtained, requires calcination to free it from impurities—arsenic, iron, lead, copper, and sulphur. One of the simplest methods of purification is by charging each of a number of crucibles with the raw A. (or regulus), together with soda, common salt, and pure oxidized antimonial ore. On application of heat the foreign metals become oxidized and scorified, and 'star metal' or nearly pure A. is obtained.

The compounds of A. are numerous: with oxygen it forms (1) the *sesquioxide*, or *white A. ore*, Sb_2O_3, which enters into the composition of tartar emetic; (2) *antimonious acid*, SbO_4, which forms one of the components of Dr. James's powders; (3) *antimonic acid*, Sb_2O_5, a very insoluble compound, obtained by acting upon the metal with concentrated nitric acid. With sulphur, A. forms the *subsulphide*, Sb_2S_3, already referred to as a natural ore of the metal, and which when roasted at a temperature sufficient to fuse it, passes into the mixed teroxide and tersulphide of A. known commercially as the *glass* of A. A native oxysulphide of a pretty red color is called *red A. ore*. When the ordinary sulphide of A. is boiled with potash, or the carbonate of potash, it dissolves; and thereafter, on boiling, deposits a reddish-brown substance, known as *mineral kermes*. The liquid from which the deposit has fallen, if treated with hydrochloric acid, throws down an orange precipitate of *golden sulphide* of A.

There is also a chloride of A., $SbCl_3$, prepared by heating sulphide of A. and hydrochloric acid together, and which has the common name of *butter* of A. It is generally obtained as an oily liquid, of the consistence of melted butter, and of a golden yellow color. Mixed with olive oil, it is used by gun-makers as *bronzing salt*, to impart a yellow color to gun-barrels. The surface of the metal is afterward polished by a burnisher, or coated with a varnish.

The various compounds of A. are used as medicinal agents, both in human and veterinary practice, especially the *tartar emetic*, a double tartrate of A. and potash, and tartaric acid, $(KSBOT)_2H_2O$; this is the active ingredient in antimonial wine. Several cases have occurred where tartar emetic has been used criminally as a poison.

Basil Valentine, in his *Triumphant Chariot of Antimony*, says: 'The shortness of life makes it impossible for one man thoroughly to learn antimony, in which every day something new is discovered.'

ANTINOMIAN, n. *ăn'tĭ-nō'mĭ-ăn* [Gr. *anti*, against; *nŏmos*, law]: one who denies that the moral law is binding on Christians, and affirms that faith alone is necessary to salvation: ADJ. relating to. AN'TINO'MIANISM, n. *-ĭzm*, the tenets of. ANTINOMY, n. *ăn-tĭn'ō-mĭ*, or *ăn'tĭ-nō-mĭ*, the opposition of one law or rule to another: see KANT, IMM'L.

ANTINOMIANISM, *ăn'tĭ-nō'mĭ-ăn-ĭzm:* the doctrine or opinion that Christians are freed from obligation to keep the law of God. It is generally regarded by the advocates of the doctrine of justification by faith, as a monstrous abuse and perversion of that doctrine, upon which it usually professes to be based. From several passages of the New

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Testament, as Rom. vi., and 2 Pet. ii. 18, 19, it seems that a tendency to A. had manifested itself even in the apostolic age; and many of the Gnostic sects were really antinomian, as were probably also some of the heretical sects of the middle ages; but the term was first used at the time of the Reformation, when it was applied by Luther to the opinions advocated by John Agricola. Agricola had adopted the principles of the Reformation; but in 1527 he found fault with Melanchthon for recommending the use of the law, and particularly of the ten commandments, in order to produce conviction and repentance, which he deemed inconsistent with the gospel. Ten years later, he maintained in a disputation at Wittenberg, that as men are justified simply by the gospel, the law is in no way necessary for justification or for sanctification. The 'Antinomian Controversy' of this time, in which Luther took a very active part, terminated in 1540 in a retraction by Agricola; but views more extreme than his were afterwards advocated by some of the English sectaries of the period of the Commonwealth; and, without being formally professed by a distinct sect, A. has been from time to time reproduced, as a tendency, with various modifications. It ought, however, to be borne in mind, that the term A. has no reference to the *conduct*, but only to the *opinions* of men; so that men who practically disregard and violate the known law of God, are not therefore antinomians; and it is certain enough that men really holding opinions more or less antinomian, have in many cases been men of good life. It is also to be observed that the term A. has been applied to opinions differing very much from each other. In its most extreme sense, it denotes the rejection of the moral law as no longer binding upon Christians; and a power or privilege is asserted for the saints to do what they please without loss of their sanctity; it being maintained that to them nothing is sinful; and this is represented as the perfection of Christian liberty. But besides this extreme A., than which nothing can be more repugnant to Christianity, there is also sometimes designated by this term the opinion of those who refuse to seek or to see in the Bible any positive laws binding upon Christians, and regard them as left to the guidance of gospel principles and the constraint of Christian love; an opinion which, whatever may be thought of its tendency, is certainly not to be deemed of the same character with the other. Probably, the A. that does not arise out of a dislike of morality, usually originates in mistaken notions of Christian liberty, or in confusion of views as to the relation between the moral law and the Jewish law of ceremonial ordinances.

ANTINOUS, *ăn-tĭn'ō-us:* a beautiful youth of Claudiopolis, in Bithynia. He was page to the emperor Hadrian, and the object of his extravagant affection, accompanying him in all his travels, but was either drowned accidentally in the river Nile, or, as some suppose, committed suicide, in 122, from a loathing of the life that he led. His memory and the grief of the emperor were perpetuated by many statues and bass-reliefs, of which several are very beautiful, especially two now in Rome—one found in the baths, and the

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other in the villa of Hadrian. 'In all figures of A.,' says Winckelmann, 'the face has a rather melancholy expression; the eyes are large with fine outlines; the profile is gently sloped downwards, and the mouth and chin are especially beautiful.' The city of Besa, in the Thebais, near to which A. was drowned, was also rebuilt by Hadrian, and the name of Antinoöpolis conferred upon it, in memory of his favorite. A. was further enrolled among the gods, and temples erected to him in Egypt and Greece.

ANTIOCH, *ăn'tĭ ŏk:* ancient cap. of the Greek kings of Syria; the most magnificent of the 16 cities of that name built by Seleucus Nicator (reigned B.C. 306–280). Its situation was admirably chosen. The river Orontes, issuing from the mountains of Lebanon, flows n. as far as the 36th parallel of lat., and then S.W. into the Levant. On the left bank of the river, after it has taken this last direction, and at a distance of 20 m. from the sea, lay the famous city, in the midst of a fertile and beautiful plain, 10 m. long by five broad. By its harbor, Seleuceia, it had communication with all the maritime cities of the West, while it also became an emporium for the merchandise of the East; for behind it lay the vast Syrian desert, across which travelled the caravans from Mesopotamia and Arabia. On the n. the plain of A. is bounded by the mountain-chain of Amanus, connected with the S.E. extremity of Mount Taurus; and on the S., which is more rocky, by the broken declivities of Mount Casius, from which the ancient town was distant less than two miles. In early times, a part of the city stood upon an island, which has now disappeared. The rest was built partly on the plain, and partly on the rugged ascent towards Mount Casius. The slopes above the city were covered with vineyards, while the banks of the river displayed, as they do even at the present day, a gorgeous profusion of eastern fruit-trees. The ancients called it 'A. the Beautiful,' 'the Crown of the East,' etc. It was a favorite residence of the Seleucid princes and of wealthy Romans, and was famed throughout the world for the abundance of its conveniences and the splendor of its luxury. It received from Strabo the name of *Tetrapolis*, on account of three new sites having been successively built upon, and each surrounded by a wall. Its public edifices were magnificent. The principal were: the Palace; the Senate-house; the Temple of Jupiter, burnished with gold; the Theatre, Amphitheatre, and Cæsarium, besides an aqueduct, a public promenade, and innumerable baths. At the beginning of the Roman empire, it was as large as Paris, and for many generations after continued to receive numerous embellishments from the emperors. Nor did its glory fade immediately after the founding of Constantinople, for though it then ceased to be the first city of the East, it rose into new dignity as a Christian city. Ten councils were held in it. Churches sprang up exhibiting a new style of architecture, which soon became prevalent; and even Constantine himself spent a considerable time here, adorning it, and strengthening its harbor, Seleuceia. The Antiochenes themselves, however, brought about the ruin of their beautiful

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city. They were famous, above all other people in ancient times, for their biting and scurrilous wit, and for their ingenuity for devising nicknames; and when the Persians, under Chosroes invaded Syria in 538, the Antiochenes could not refrain from jesting at them. The Persians took ample revenge by the total destruction of the city, which, however, was rebuilt by Justinian. The next important event in its history was its conquest by the Saracens in the 7th c. In the 9th c. it was recovered by the Greeks under Nicephorus Phocas, but in 1084 it again fell into the hands of the Mohammedans. The Crusaders besieged and took it, 1098, June 3. At the close of the 13th c., the sultan of Egypt seized it; since then it has undergone a variety of vicissitudes, and at present forms a portion of Syria, in the eyalet of Aleppo. Its modern name is *Antakieh*. It exhibits almost no traces of its former grandeur, except the ruins of the wall built by Justinian, and of the fortress erected by the Crusaders. Its manufactures are few and unimportant. In 1872, A. was mostly destroyed by an earthquake, and the pop., which was then estimated about 17,000, was in consequence greatly reduced.

ANTIOCHUS, *ăn-tī'ō-kŭs*: a common Greek name, borne by thirteen kings of Syria, four kings of Commagene (a small country between the Euphrates and Mount Taurus), and many other persons of note (see Smith's *Dictionary of Greek and Roman Biography*).

ANTIOCHUS SOTER, the first of the Syrian dynasty, or Seleucidæ, as they were called from their founder: prob. B.C. 324–261, was the son of Seleucus, the general and one of the successors of Alexander. A. was the fruit of one of those marriages which Alexander celebrated at Susa between his generals and the princesses of Persia. His mother's name was Apama. From this fact we gather the probable date of his birth. For the earlier career of A., see SELEUCUS. On the murder of his father, B.C. 280, A. succeeded him in his dominions, but he afterwards permitted Antigonus Gonatas to retain possession of Macedonia on his marrying Phila, a daughter of Seleucus. A. was much occupied in wars with the Gauls, who invaded Asia Minor, and, on one occasion is said to have gained a victory over them by the help of his elephants, from which circumstance he derived the name of Soter (Saviour). He was killed in a battle with the Gauls, and was succeeded by his son A. II. This A. is mentioned in the Book of Daniel (xi. 6) as the king of the north—the king of the south being Ptolemy, whose daughter, Berenice, A. had been compelled to marry. On the death of Ptolemy, A. recalled his former wife, Laodice; but she, in revenge for the insult which she had received, caused A. to be murdered, along with Berenice and her son. A. lost the provinces of Parthia and Bactria.

ANTIOCHUS III., surnamed the Great, the most distinguished of the Seleucidæ, was the son of Seleucus Callinicus, and grandson of A. II.: d. B.C. 187. In his earlier wars with Ptolemy Philopator, A. was generally successful; and though defeated in a great battle near Gaza, he afterwards, by his victory over the Egyptian general, Scopas, obtained

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entire possession of Palestine and Cœle-Syria. In this war he was assisted by the Jews, to whom he granted many privileges. Fearing the power of the Romans, A. at length concluded a peace with Egypt, betrothed his daughter Cleopatra to the young king Ptolemy, and gave her Cœle-Syria and Palestine as a dowry. The formidable enemy which he thus hoped to escape encountered him at a later period of his career. Having conquered Philip of Macedonia, the Romans no longer dreaded a war with A., and accordingly sent him an embassy, demanding the surrender of the Thracian Chersonese, and of the places which he had conquered from Ptolemy, whose guardian the Romans had become. He was entirely defeated by the consul Acilius Glabrio at Thermopylæ, B.C. 191, and was compelled to return to Asia. Having a second time tried the fortune of war, he was defeated by Scipio, who had crossed over into Asia; and very severe terms were imposed on him. He found so much difficulty in raising money to pay the tribute demanded by the Romans, that he was led to plunder a temple in Elymais, when the people rose against him, and killed him. The fate of A was foretold in the Book of Daniel (xi. 18, 19).

ANTIOCHUS IV., surnamed EPIPHANES: (reigned B.C. 175–164): by his tyranny and sacrilege excited the Jews to a successful insurrection under their leaders, Mattathias, Judas Maccabæus, and the other members of that heroic family. The monstrous life of A. is recorded in the books of the Maccabees.

ANTIOCHUS XIII., surnamed ASIATICUS, the last of the Seleucidæ, was deprived of his kingdom by Pompey, who reduced Syria to a Roman prov., B.C. 65.

ANTIPAROS, *ăn-tĭp'ă-rŏs:* (anciently called *Olearos* or *Oliaros*): one of the Cyclades Islands, celebrated for a stalactitic cave. It is separated from Paros by a narrow strait, and forms a part of the eparchy of Naxos. A. is 7 m. in length by about 3 in breadth; it is scantily supplied with water, but the flats in the n. and w. are moderately fertile. Corn and wine are cultivated, but not largely. The principal occupation of the inhabitants is fishing. From Kastron, the only village in the island, the distance to the celebrated grotto is about an hour and a half's ride. This wonderful cave is not alluded to by any Greek or Roman writer whose works are extant, but must have been visited by the curiosity-hunters of antiquity, for, in 1806, Col. Leake deciphered a Hellenic inscription which contained the names of those who had descended into it in ancient times. It is situated in the side of a mountain on the s. coast of the island, which is described as a mass of white marble. The top or entrance of the cave has a striking appearance; but the sloping descent is rather dangerous, on account of the cord by which the traveller holds being extremely slippery from constant humidity. The bottom once reached, and the grotto entered, there is presented to the eye a dazzling specimen of stalactitic formation—the roof, floor, and walls of the various chambers, all glittering with the most gorgeous incrustation, though it is said that the smoke of

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the torches, and the constant fingering of visitors, are sullying the primitive purity of the massive columns. It is believed that there are other caves of equal splendor in the vicinity not yet discovered. The height of the known cavern is 80 ft.; its length and breadth more than 300; but it seems the eye can only take in at once a length of 150 ft., and a breadth of 100. The grotto was first made known to the modern world in 1673, by the then French embassador to the Porte, M. de Nointel. Pop. of A. abt. 500.

ANTIPAS: see HEROD ANTIPAS.

ANTIPATER, *ăn-tip'ă-ter:* d. B.C. 318 or 319: one of the generals and confidential friends of Philip, king of Macedon: the most celebrated of the many who bore the name A. in antiquity. When Alexander led his troops into Asia, he left A.—who, with Parmenion, had endeavored to dissuade him from the expedition—as governor of Macedonia. A. discharged the duties of this office with great ability, suppressing the insurrections in Thrace and Sparta; but Olympias, the mother of Alexander, who entertained a dislike to A., prevailed on her son to appoint Craterus as regent of Macedonia. Alexander, prompted also, it is supposed, by his own jealousy of A., consented, but died before the change was carried into effect; and A. was left to share with Craterus the government of Alexander's territories in Europe. The government of Macedonia was assigned to him; and soon after, he was called upon to defend himself against an alliance of the Grecian states. With the assistance of Craterus—on whom he afterwards bestowed his daughter Phila in marriage—and to a certain extent of Leonnatus, he succeeded in reducing the allies to subjection. Democracy at Athens was abolished, and a garrison admitted into Munychia, and the leaders of the popular party put to death. When Demosthenes was summoned to the presence of A., he took poison, which for some time he had been carrying on his person, and died in the temple of Poseidon, B.C. 322. This war was followed by another with Perdiccas, who was also his son-in-law, in which A. was again successful. After the murder of Perdiccas in 321, A. was appointed to the supreme regency of the kingdom, and the guardianship of Alexander's children. He died at an advanced age, leaving the regency to Polysperchon, to the exclusion of his own son Cassander.

Others of this name were: 1. A., second son of Cassander, king of Macedonia, who lived B.C. 3d c.—2. A., the father of Herod the Great. He lived in the days of Pompey and Julius Cæsar, was a firm friend of the Romans, and about B.C. 47 was appointed procurator of Judea. He was poisoned in 43 by one whose life he had twice saved.—3. A., grandson of the former, and son of Herod the Great by his first wife Doris, a worthless prince, perpetually conspiring against the life of his brothers, until his trial and condemnation at Jerusalem before Quintilius Varus, the Roman governor of Syria. He was put to death in prison five days before Herod died, and in the same year with the massacre of the innocents at Bethlehem.

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A. was the name also of various eminent men in ancient times—physicians, philosophers, historians, poets, mathematicians, and grammarians.

ANTIPATHY, n. *ăn-tĭp'ă-thĭ* [F. *antipathie*, antipathy —from Gr. *antipathei'a*—from *anti*, against; pathos, feeling]: a feeling of hatred; natural aversion; dislike. ANTIP'ATHET'IC, a. *-ĭk;* or AN'TIPATHET'ICAL, a. *-ĭk-ăl*, having a constitutional aversion to a thing.—SYN. of 'antipathy': hatred; aversion; enmity; repugnance; ill-will; rancor; malice; malevolence; dislike; disgust; distaste; opposition; contrariety.

ANTIPATHY: term applied to a class of disagreeable sensations felt by some individuals regarding things innocuous or agreeable to the majority of mankind. These peculiarities are no doubt sometimes acquired in early life by injudiciously terrifying children with some object—the mental impression becoming permanent. A large class of persons have an A. to animal food, and from childhood refuse to taste it. In others, the aversion is limited to one kind of meat, as veal or pork; others are averse to eggs or milk. Nor is this feeling a conscious caprice, which an exertion of the will might remove; for it is generally found that contact with the object of the A. is resented by the bodily economy, and symptoms of poisoning are rapidly produced. Some are affected with these symptoms who have no mental aversion to the article. We read of a countess who had a liking for beef-udder, but directly it touched her lips they became swollen. There is also the case of a boy, who, 'if at any time he ate of an egg, his lips would swell, in his face would rise purple and black spots, and he would froth at the mouth.' Some medicines affect particular persons dangerously, even when given in very minute doses: a single grain of mercury has been known to induce a profuse salivation, with destruction of the jaw-bones. On others, medicines have a peculiar effect—astringents may purge. Many persons suffer with the most distressing irritation of the nasal and palpebral mucous membranes, produced by the exhalations arising from the fields during the inflorescence of the hay-crop. In others, an asthmatic condition is induced by the same cause. The air of some places has a similar influence on individuals: one gentleman was always attacked with asthma if he slept in the town of Kilkenny, and another rarely escaped a fit of that complaint if he slept anywhere else.

The most remarkable antipathies are those affecting the special senses. Nearly all persons have a loathing at reptiles, but some few *faint* on *seeing* a toad or lizard, others on seeing insects. 'The Duke d'Epernon swooned at sight of a leveret—a hare did not produce the same effect. Tycho Brahé fainted at sight of a fox, Henry III. of France at that of a cat, and Marshal d'Albert at a pig.'—*Millingen.*

Hearing a wet finger drawn on glass, the grinding of knives, or a creaking wheel, is sufficient to produce fainting in some. *Smelling* musk or ambergris throws some into convulsions; and we have seen how articles of food affect

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others—often, no doubt, owing to perverted taste. The *touch* of anything unusually smooth has the same effect sometimes. Zimmerman records the case of a lady who was thus affected by the feeling of silk, satin, or the velvety skin of a peach See IDIOSYNCRASY.

ANTIPERIODICS, *ăn'tĭ-pē-rĭ-ŏd'ĭks:* drugs that relieve or cure diseases of periodic occurrence—as ague and some forms of neuralgia. Cinchona and its alkaloids are A.

ANTIPERISTALTIC, a. *ăn'tĭ-pĕr-ĭ-stăl'tĭk* [Gr. *anti*, against; *peristal'tikos*, drawing together all round—from *peri*, around; *stello*, I send]: applied to the vermicular contraction of the intestinal tube when that takes place in direction from behind forwards. AN TIPERISTAL SIS, n, *-stăl sis*, the inversion of the peristaltic motion of the intestines.

ANTIPHLOGISTIC, a. *ăn'tĭ-flō-jĭs'tĭk* [Gr. *anti*, against, *phlogi zo*, I consume or burn up]: applied to medical treatment intended to subdue inflammation; such as bloodletting, purgatives, low diet, etc.: N. a medicine that checks inflammation.

ANTIPHON, *ăn'tĭ-fŏn:* b. Rhamnus, Attica, B.C. 480; son of Sophilus, the Sophist; earliest of the ten Attic orators in the Alexandrine canon: in his youth, the reputation of Gorgias, the most showy and insincere of all the Greek rhetoricians, was at its height. A. soon became convinced of the worthlessness of that oratory which the fashion of the time so highly valued, and resolved to introduce a new and better kind. He labored to make his arguments clear, solid, and convincing, so that it might be impossible for the judges who listened to the speeches he wrote to refuse their assent to his propositions. His success was unmistakable. Although he never made a public appearance as a pleader in the courts of justice, but contented himself with writing speeches for others to deliver, he acquired great influence, which he did not fail to exert for the furtherance of his political principles. To him must be attributed the overthrow of the Athenian democracy (B.C. 411), and the establishment of the oligarchical government of the Four Hundred; for although Pisander figured prominently before the people in this revolution, the whole affair, according to Thucydides—one of A.'s pupils in oratory, and a man admirably fitted to judge of such a point—was secretly planned by him. The oligarchical government did not prosper. Dissensions quickly broke out among the Four Hundred, and six months after, Alcibiades, the brilliant demagogue, was recalled. A. was brought to trial for treason, in having attempted to negotiate peace with Sparta. He is said to have made a noble defense of himself. Thucydides affirms that an abler was never made by any man in a similar position. It was his first and last oration. He was condemned to death; his property was confiscated, his house razed to the ground, his remains forbidden interment in Attica, and his children forever declared incapable of enjoying civic privileges. Of the 60 orations of A. which the ancients possessed, only 15 have come down to us. Three

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of these are written for others, and are greatly admired for their clearness, purity, and vigor of expression; the remaining 12 appearing to have been intended as specimens of school rhetoric for his pupils, are not so highly esteemed.

ANTIPHONY, n., or ANTIPHONE, n. *ăn-tĭf'ō-nĭ* [Gr. *antĭphōnē;* mid. L. *antiphōna*—from Gr. *anti*, opposite; *phōnē*, sound: F. *antiphone:* AS. *antefen*]: the alternate singing of two choirs. ANTIPHONAL, a. *ăn-tĭf'ō-năl*, pertaining to: N. a book of antiphons. ANTIPHON, n. *ăn'tĭ-fŏn*, the hymn sung in parts by turns; same as *antiphony;* the chant of alternate singing in choirs; the repeating, chanting, or singing of versicles or parts alternately.

ANTIPHONY, or ANTIPHONE: among the ancient Greeks, a species of musical accompaniment in the octave, by instruments or voices, in opposition to that executed in unison, which they called *Homophony.* A. (often called ANTIPHON) is also a species of sacred song, sung by two parties, each responding to the other; a practice in the early ages of the Hebrews, Greeks, and Romans. Many of the Psalms of David show that antiphonal singing was then in use. Its introduction into the Greek Church is ascribed to Ignatius, Bishop of Antioch, 2d c.; and Ambrosius, Bishop of Milan, is said to have introduced it into the Western Church, 4th c. The dividing of the antiphonies into verses, with rules regarding the same, is attributed to Pope Cœlestin in 432. Pope Gregory I., 590, prepared the first regular *Antiphonarium* (see *Durandi Rationale Divinorum Officiorum*, Mainz, 1459). It was early a custom, which became common after the 13th c., to date deeds with the beginning words of the A. (*Introitus*), which in those times served for the day of the month and of the week. The Reformed Christian Churches of Germany and England have retained a certain degree of antiphonal singing.

ANTIPHRASIS, n. *ăn-tĭf'rā-sĭs* [Gr. *antī*, opposite; *phrasis*, a form of speech]: the use of words in a sense opposite to their proper meaning; irony. AN'TIPHRAS'TICAL, a. *-tĭ-kăl.* AN'TIPHRAS'TICALLY, ad. *-kăl-ĭ.*

ANTIPODES, n. plu. *ăn-tĭp'ō-dēz* [Gr. *anti*, opposite; *podes*, feet]: those who live on the opposite side of the globe, and whose feet are directly opposite to those of the speaker; the country occupied by such. ANTIPODE, n. *ăn'tĭ-pōd*, one who lives on the opposite side of the globe. ANTIP'ODAL, a. having the feet directly opposite. *Note.*—As the singular ANTIPODE, *ăn'tĭ-pōd*, is now in use, there may be no good reason for objecting to *ăn'tĭ-pōdz* as an alternative pronunciation of the plural.

ANTIPODES, in Geography: inhabitants of any two opposite points of the globe, or in other words, the dwellers at the opposite extremities of any diameter of the earth. From this primary relation, there necessarily arise many secondary relations. A. must be on one and the same meridional circle, separated from each other by half the circumference. Being on one and the same meridional circle, they must differ in long. exactly 180°. with the exception of the

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poles themselves, as having no longitude at all: and being separated from each other by half the circumference, they must be equidistant from the equator in opposite directions. Take New York, as an example in lat. 40° 42′ 33″ n., and long. 74° 0 3″ w.; its A. must be in lat. 40° 0′ 3′ s. and in long 254° 0′ 3″ w., or rather in 90° 18′ 27″ e., which is merely an undistinguishable spot in the Indian Ocean. Take, as another example, London, in lat. 51° 30′ n., and long. 0° 5′ w. Its A. must be in lat. 51° 30′ s., and in long. 180° 5′ w., or rather 179° 55′ e.—coinciding nearly with a small island to the s.e. of New Zealand. This small island, in honor rather of London than of itself, has appropriated the term A. as its own peculiar name.

Between A. in general there necessarily exist also other secondary relations. With reference to the earth's daily rotation, the noon of the one side must be the midnight of the other; while, with regard to its annual revolution, the summer and the autumn of the one side must be the winter and the spring of the other. With respect, however, to the former contrast, some explanation may be required. This, for instance, being Wednesday in London, was last midnight in that city the noon of Tuesday or of Wednesday at A. Island? The answer is, that, according to circumstances, it may be held to be either one or the other. In going eastward—that is, in meeting the sun—one, from day to day, anticipates every noon and every midnight in the proportion of 4 min. of time to 1° of long., or of 12 hours of time to 180° of long.; so that, on reaching A. Island from London by the Cape of Good Hope, the middle of Tuesday night, by Greenwich reckoning, is actually regarded on the spot as the noon of Wednesday. In going westward—that is, in leading, as it were, the sun—one, from day to day, postpones every noon and every midnight in the same proportion as above; so that, on reaching A. Island from London by Cape Horn, the middle of Tuesday night, by Greenwich reckoning, is actually regarded on the spot as the noon of Tuesday. In fact, navigators in opposite directions, meeting at any intermediate point whatever of the earth's circumference, always differ in their computation of time by a whole day, or 24 hours. In two cases, this has been permanently exemplified: the Spaniards at the Philippines, who have come from the e. are a day behind the Portuguese in Macao, who have come from the w.; while, on the n.w. coast of America, the Russians from the w. were a day in advance of the British from the east.

ANTIPOPE, n. *ăn′tĭ-pōp* [Gr. *anti*, against, and *pope*]: a pontiff elected in opposition to the pope canonically chosen. The first A. is reputed to be Felix during the pontificate of Damasus (366–384). Several emperors of Germany set up popes against those whom the Romans had elected without consulting them. Otho the Great displaced successively two bishops of Rome; and when Sylvester III. had expelled the simoniacal and profligate pope Benedict IX., Conrad II. king of Germany, brought back this worthless pastor, who hastened to sell his dignity to Gregory VI. There were now consequently, three popes, and their num-

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ber was increased to four by the election of Clement II. in 1046. Shortly after, Alexander II. found a rival in Honorius II.; and in 1080 the same unseemly spectacle was witnessed, when Henry IV., emperor of Germany, elevated to the papal chair Guibert of Ravenna, under the title of Clement III., in opposition to his implacable adversary, Gregory VII. But after the death of Gregory, Clement was himself opposed successively by Victor III. and Urban II., and at last died at a distance from Rome, having just beheld the exaltation of Pascal II. as the successor of Urban. During the 12th c. there were several antipopes, such as Gregory VIII. and Honorius III. On the death of the latter, France began to intermeddle in these disgraceful strifes, and upheld the cause of Innocent II. against Anaclet; while the kings of Sicily, on the other hand, more than once set up a pontiff of their own against the choice of the emperors. Between 1159 and 1378, there were four antipopes; but the most remarkable epoch is 'the great schism of the West,' produced by these rivalries in 1378—a schism which divided the church for fifty years. It broke out after the death of Gregory XI., at the election of Urban VI., whom the voice of the Roman people, demanding an Italian pope, and not one who should fix his pontificate, like several of his predecessors, at a distance from Rome, had elevated to the papal throne. The French cardinals objected, withdrew to Provence, and elected a new pope, under the name of Clement VII., who was recognized by France, Spain, Savoy, and Scotland; while Italy, Germany, England, and the whole n. of Europe, supported Urban VI. These two popes excommunicated each other; nor did they even fear to compromise their sacred character by the most cruel outrages and the most odious insults. The schism continued after their death, when three popes were elected by different parties, all of whom were deposed by the Council of Constance in 1415, and Cardinal Colonna elected in their room, under the title of Martin V. The last A. was Clement VIII. —See INFALLIBILITY OF THE CHURCH: POPE.

ANTIPYRETIC, n. *ăn'tĭ-pī-rĕt'ĭk* [Gr. *anti*, against; *puretos*, fever]: in *med.*, an agent to reduce the bodily temperature in fever. Such agents are in two classes: (1) those which lessen heat production; (2) those which increase the loss of heat. In the first class are such drugs as quinine, salicylic acid and its salts, and some of the essential oils, eucalyptol, thymol, etc., which lessen production of heat by modifying tissue change: also such drugs as aconite and digitalis which influence the production of heat through the circulation. The 2d class is divided into (*a*) those which by, dilating the cutaneous vessels permit increased radiation, e.g. alcohol, antipyrin, phenacetine, etc.; (*b*) those which by increasing perspiration tend to loss of heat by evaporation, e.g., opium, ipecacuanha, nitrous ether, etc.; (*c*) those that abstract heat from the body, e.g., ice to the surface, cold bath, etc. ANTIPYRIN, or ANTIPYRINE, white crystalline powder, tasteless and soluble in water; dimethyl-oxycychiniane, formula $C^{11}H_{12}N^2O$; product of the destructive distillation of coal-tar oil.

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It is one of the most efficient febrifuges, and not harmful when administered by a competent physician. Serious results and even death have followed its careless use, due to its depressing action on the heart. It is useful whenever it is desirable to reduce the bodily temperature, and in painful affections of the nervous system. The majority of patent nostrums for relief of headache contain either A. or acetanilid, and should therefore be avoided, as the ingestion of such powerful drugs in unknown quantities may produce very serious symptoms much worse than the primary trouble.

ANTIQUARIES, SOCIETY OF: see ARCHÆOLOGY.

ANTIQUE, *ăn-tēk'*: term applied to the works of art of the ancient Greeks and Romans especially their incomparable sculptures. The A. Style in works of art is distinguished by critics from the Romantic or Mediæval, and also from the Modern. The sculpture of the Greeks is characterized by freshness, originality, and ideality; and the phases that it underwent have their parallels in the development of the literature and general culture of that people. In the earliest times, the statues had a rigid, formal character, and looked more like the idols of barbarous nations than deities in human form; then came stern, Titan-like forms, corresponding with the Prometheus of Æschylus; next, the sculptures of Phidias, Polycletes, and Polygnotus—like the characters in the dramas of Sophocles—present to us humanity in its purest and noblest ideal forms. Then, as Euripides in poetry left the old domain of destiny, and derived motives and action from ordinary human passions, so statuary descended from the ideal, to a closer resemblance to the forms of actual life; as we see in the works of Praxiteles and Lysippus. Afterwards, when Aristophanes introduced comedy, forms of every-day life began to appear in sculpture; and thus a gradual transition was made from the art of the Greeks, which was ideal, in the true sense of the word, to that of the Romans, which was real, monumental, and portrait-like. The Romans were the realists of the ancient world; their indigenous philosophy was of a popular kind; their poetry, so far as it was national, was satire; and their works of art may be regarded as monuments and portraitures of real life.

ANTIQUITIES: see ARCHÆOLOGY.

ANTIQUITY, n. *ăn-tĭk'wĭ-tĭ* [F. *antiquité;* L. *antiq'-uĭtas*, ancient time—from L. *anti'quus*, old] old times; former ages; times long since past. ANTIQUITIES, plu. *ăn-tĭk'wĭ-tĭz*, relics of olden times. ANTIQUARIAN, n. *ăn'tĭ-kwā'rĭ-ăn*, or ANTIQUARY, n. *ăn'tĭ-kwā-rĭ* [L. *antiquārĭus*, studious of antiquity]: a person who studies the history of ancient things. ANTIQUA'RIAN, a. pertaining to antiquity. AN'TIQUA'RIANISM, n. ANTIQUATE, v. *ăn'tĭ-kwāt*, to put out of use; to make old. AN'TIQUA'TING, imp. AN'TIQUA'TED, pp.: ADJ. grown old; old-fashioned. AN'TIQUA'TEDLY, ad. *-lĭ*. AN'TIQUA'TEDNESS, n. ANTIQUE, a. *ăn-tēk'* [F. *antique*]: old; ancient: N. a remnant of antiquity; a relic. ANTIQUE'LY, ad. *-lĭ*, in an antique manner.

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ANTIQUENESS, n. *ăn-tēk'nĕs*, ancientness; the appearance of being old.—SYN. of 'antique, a.': ancient; antiquated; obsolete; antic; old; aged.

ANTI-RABIC TREATMENT: see RABIES: HYDROPHOBIA: [PASTEUR].

ANTI-RENTERS: political party in N. Y. 1843–47: see PATROON: VAN RENSSELAER, KILLIAN.

ANTIRRHINUM, n. *ăn'tĭ-rī'nŭm*, AN'TIRRHI'NUMS, n. plu. [Gr. *anti*, like, similar; *rhin* or *rhina*, a snout]: a genus of plants, Ord. *Scroph'ularia'ceæ*, the flowers of most of the species bearing a perfect resemblance to the snout of some animals. See SNAPDRAGON.

ANTISCIANS, n. plu. *ăn-tĭsh'ĭ-ănz*, or ANTIS'CII, *ăn-tĭsh'ĭ-ī* [L. *antiscii*—from Gr. *anti*, opposite; *skiă*, a shadow]: the inhabitants of the earth living on opposite sides of the equator, whose shadows at noon fall in contrary directions.

ANTISCORBUTIC, a. *ăn'tĭ-skŏr-bū'tĭk* [Gr. *anti*, against, and *scorbutic*]: good against the scurvy: N. that which is good against scurvy. See SCURVY.

ANTI-SEMITIC MOVEMENT: recent movement in Europe involving socialistic tendencies, and opposing the Jews as alien by race and religion to the peoples among whom they dwell. In Germany, at its first congress (1895, June), the anti-Semites demanded the exclusion of all persons of Jewish connection from the professions, the army, the press, from all public schools, and from the privilege of acquiring property or carrying on business under German names; and that for the future all Jews should be forbidden to enter Germany from without. In Austria the anti-Semites (1895) elected their candidate mayor of Vienna, but the emperor refused to confirm the election. In Switzerland (1893) a law was passed forbidding the killing of animals according to the Talmud, by bleeding before the death-blow. This law is contested on the ground of religious liberty. In France, the party gained some power after the Panama canal scandals (1893). See JEWS: RUSSIA.

ANTISEPTIC, *ăn'tĭ-sĕp'tĭk* [Gr. *anti*, against; *septos*, putrid]: a substance that prevents or arrests putrefaction and analogous fermentive changes: ADJ. opposing putrefaction. It has been proved that putrefaction (q.v.), fermentation of grape-juice (*vinous fermentation*), of milk *lactic fermentation*), and many, though probably not all, other fermentations, depend upon the presence of microscopic vegetable organisms. See GERM THEORY. To prevent these processes, then, it is necessary either (1) to exclude these organisms altogether; or (2) to interfere with conditions which permit of their development; or (3) to destroy their vitality.

(1) These organisms, or their germs, are present in ordinary air; but it has been shown by Pasteur, Tyndall, Lister, Roberts, and others, that if air be filtered through cotton wool, or (if moving slowly) through a fine bent tube, it may be allowed to come in contact with putrescible substances, if these themselves contain no living organisms or germs,

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without causing putrefaction. This method, however, has had no important practical applications.

(2) Their growth may be arrested (*a*) by a low temperature. Thus large quantities of fresh meat are exported from America, and even Australia and New Zealand, in chambers cooled to near the freezing-point. Carcasses of the long-extinct mammoth, with the flesh still present, have been found in the ice-cliffs of Siberia. The longer time that meat, milk, etc., keep in cold than in hot weather is familiar. (*b*) By absence of moisture. Thus, if the contents of an egg be thrown out on a plate, and thoroughly dried in an oven, the whole becomes of a hard, horny consistence, and may be kept in this state for years. If soaked in water, it will soon begin to putrefy. In the same way meat may be kept fresh by thoroughly drying it. The preservation of fruits, etc., in strong syrup is an example of a similar action.

(3) The vitality of these organisms may be destroyed (*a*) by heat; e.g.. meat and other eatables can be preserved for an indefinite time if they are boiled and hermetically sealed when still hot in tin vessels (see PRESERVES); (*b*) by various chemical substances. Some of the most important are common salt and saltpetre, used in curing fish, pickling meat, etc.; alcohol, in preserving zoölogical specimens, vegetable essences, fruits, etc.; sulphurous acid, boracic acid, and arsenious acid; many salts, as chloride of zinc (Burnett's solution, q.v.), permanganate of potash (Condy's fluid, see under MANGANESE), sulphate of copper (blue vitriol), corrosive sublimate, nitrate of silver; chlorine (given off by chloride of lime), iodine, iodoform (CHI_3), glycerine, boroglyceride ($C_3H_5Bo_3$), eucalyptus oil, thymol, creosote, carbolic acid, salicylic acid, tannic ocid, quinine, the patent preparation 'sanitas,' charcoal (both vegetable and animal), dry mold, used in the earth-closet system. See SEWAGE EARTH-CLOSET. All these substances act directly or indirectly as poisons to the organisms which produce putrefaction, etc.; most of them are either poisonous or very unpalatable to man, and cannot therefore be used in preserving food. Many of them are, however, used in the arts to arrest the decomposition of putrescible substances; e.g., in the manufacture of size for writing-paper from scraps of hides, sulphite of soda or antichlore, containing sulphurous acid, is added; hides are preserved by salt, or, when tanned, by tannin, a compound of tannic acid; timber is found less liable to decay if charged with an antiseptic, such as sulphate of copper, chloride of zinc, corrosive sublimate, or creosote. It is placed in a steam-box, so that the air contained in its pores is replaced by steam; the whole casing is then closed tight, and allowed to cool; the steam condenses and leaves a vacuum in and around the wood. If one of these substances is then introduced, it finds its way into the innermost pores of the timber. See WOOD-PRESERVING.

But next to the preservation of food, the most important purposes for which antiseptic methods and substances are used are the *prevention of infectious diseases*, and the *treatment of wounds*.

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eases are closely analogous to those of the organisms that lead to putrefaction, etc.; and even in cases where its organic nature has not been proved (see GERM THEORY), can be rendered inert by a proper use of A., or by exposure to a high temperature. Thus anything that has come near the patient suffering from an infectious disease, also the discharges from his person, can be made harmless by carbolic acid, chloride of zinc, or some other antiseptic; his bedding is roasted in an oven at a temperature of 212° F. or more; the room where he has been treated is fumigated with chlorine or sulphurous acid, and so the disease is prevented from spreading. This is one of the chief aims of medical practice at the present day. See DISINFECTANTS.

Many of the evil effects which follow wounds and surgical operations are due to the presence of microscopic organisms (see PYÆMIA); and the effects of their antiseptic treatment, introduced by Mr. Lister, have been marvellous. See CARBOLIC ACID: ASEPSIS.

ANTI-SLAVERY, n. *ăn'tĭ-slā'vĕr-ĭ* [Gr. *anti*, against, and *slavery*]: hostility to slavery. See ABOLITIONISTS.

ANTI-SLAVERY SOCIETY, THE AMERICAN: organized in Philadelphia 1833, Dec.; disbanded after the accomplishment of its mission 1870, Apr. 9. It was an outgrowth of the New England Anti-Slavery Soc., organized in Boston 1832, Jan. 6, by William Lloyd Garrison, Oliver Johnson, and others. The founders of the American Soc. were actuated by a belief that slavery was contrary to the principles of natural justice, our republican form of govt., and the Christian religion; that it was destructive of the prosperity of the country; that it endangered the peace, union, and liberties of the states; and that no scheme of expatriation could remove the evil. The declared object of the soc. was the entire abolition of slavery in the United States; and it pledged itself to strive to elevate the character and condition of the colored people, by encouraging their intellectual, moral, and religious improvement, and by removing public prejudice, that they might, according to their intellectual and moral worth, share an equality with the whites of civil and religious privileges. But it further and emphatically declared that it would never countenance the slaves in attempts to vindicate their rights by resorting to physical force. After its organization was completed, the soc. published a 'Declaration of Sentiments,' in which it further expressed the views of its founders on the question of slavery, and noted some of the measures determined on for the accomplishment of its object. The successive presidents of the soc. were Arthur Tappan, Lindley Coates, William Lloyd Garrison, and Wendell Phillips, and among its other officers and active promoters were Benjamin Lundy, Lucretia Mott, William Jay, John G. Whittier, Abby Kelly Foster, Gerrit Smith, Samuel J. May, Owen Lovejoy, and Edward Beecher. The soc. encountered hostility not only in political but in social and religious circles from its organization, and till the civil war began to establish unalterably the principles for which its members labored at the risk of their lives,

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the soc: was constantly beset by danger, trouble, and malevolence. The Emancipation Proclamation and the ratification of the 13th, 14th, and 15th amendments to the federal constitution were the substantial fruits of a long and heroic struggle for the oppressed. See SLAVERY.

ANTISPASMODIC, a. *ăn'tĭ-spăs·mŏd'ĭk* [Gr.. *anti*, against; *spasmos*, a convulsion or spasm]: applied to medicines that have power to allay spasmodic pains. See SPASM.

ANTISTHENES, *ăn-tĭs'thē-nēz:* founder of the Cynic school of philosophy; son of A., an Athenian. He fought in his youth at Tanagra (B.C. 426), survived the battle of Leuctra (B.C. 371), and d. at Athens at the age of 70. After listening to the teaching of Socrates, he gave up rhetoric, which he had followed at first as a disciple of Gorgias, and applied himself wholly to philosophy. He was present at the death of Socrates, and never forgave his persecutors. A. held that virtue mainly consists in voluntary abstinence from pleasure, and in a stern contempt of riches, honors, and even learning. Opinions of still greater extravagance are ascribed to A., but it is probable that they were extreme views, which he put into the mouths of the interlocutors in his dialogues, rather than expressions of his own views. Even in his condemnation of pleasure, he excepted such as springs from the soul, or is founded on true friendship. In consistency with his teaching, A. appeared as a beggar, clad in ragged garments—an eccentricity which Socrates is said to have reproved by saying, 'I see your pride through the holes in your cloak.' The singularity affected by A. gained many imitators, and among them Diogenes, who chose to live in a tub, and surpassed the master himself in Cynic practice. After the death of Socrates, A. taught moral and practical philosophy in the Athenian gymnasium Cynosarges, from which, it is said, his school derived its title. His writings—among them a polemical work against Plato—have mostly perished. Such fragments as remain have been collected by Winckelmann (*A.*, *Fragmenta*, Zurich, 1842). Ritter classes A. with the 'imperfect Socraticists.'

ANTISTROPHE, n. *ăn-tĭs'trō-fē* [Gr. *anti*, opposite; *strophē*, a turning]: in *anc. poetry*, the stanza of a chorus or ode succeeding the strophe; in dancing around the altar, the *strophē* was sung while turning from the right to the left, and the *antistrophe* in turning from the left to the right—otherwise the former in turning from east to west, and the latter in turning from west to east. AN'TISTROPH'IC, a. *strŏf'ĭk*, of or pertaining to.

ANTITHESIS, n. *ăn-tĭth'ĕ-sĭs*. ANTITH'ESES, n. plu. *-ĕ-sēz* [Gr. *antithĕsis*, placing in opposition—from *anti*, against; *thĕsis*, a placing]: opposition or contrast in words or sentiments. ANTITHETIC, a. *ăn'tĭ-thĕt'ĭk*, or AN'TITHET'ICAL, a. *-ĭ-kăl*, being in contrast; containing opposition of words or sentiments. AN'TITHET'ICALLY, ad. *-lĭ*.

ANTITHESIS: figure of speech in which words are placed in direct opposition to each other to produce a strong

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contrast. Thus Lessing, in criticism on a book, says: 'It contains many good things, and many new; but the good are not new, and the new are not good.' A , naturally and moderately employed, gives liveliness to style; but becomes wearisome when too often repeated.

ANTI-TOXIN, *ăn-tĭ-toks'ĭn:* new treatment for diphtheria by injection of serum from the blood of some animal, e.g. the horse, rendered immune to the disease by repeated injections of bacilli. Many favorable but occasional harmful results have attended its use. See KOCH, ROBERT: BACTERIA.

ANTI-TRADES: name given to upper tropical winds, because blowing in directions opposite to trade-winds.

ANTITRINITARIAN: one who denies the doctrine of the Trinity. An A. differs from a Unitarian only in this respect, that his objection to the doctrine in question is made on philosophical, while that of the latter is made on theological grounds. A Unitarian (at least according to the strict usage of former times—the theological limits of Unitarianism have now become more vague) is one who accepts the Bible as inspired, but does not find in it the doctrine of the Trinity; an A. is, or may be, a philosophical theist who denies the inspiration of Scripture. See UNITARIAN: SOCINIAN.

ANTITROPAL, a. *ăn-tĭt'rō-păl,* or ANTIT'ROPOUS, a. *-pŭs* [Gr. *anti,* against; *tropē'ō,* I turn]: in *bot.,* at the extremity most remote from the hilum, as the embryo—or inverted with respect to the seed, as the radicle.

ANTITYPE, a. *ăn'tĭ-tīp* [Gr. *anti,* against; *tupos,* a pattern]: the reality, of which the resemblance or pattern is called the *type*—thus, the paschal lamb is called the *type,* and Christ the *antitype.* See TYPE. ANTITYPICAL, a *ăn'tĭ-tĭp'ĭ-kăl,* that which explains the type. AN'TITYP'ICALLY, ad. *-lĭ.*

ANTIUM, *ăn'shĭ-ŭm:* one of the most ancient cities of Latium; stood on the coast 34 m. s s.e. from Rome. Favorably situated for commerce and piracy, it became, under the Volscians, into whose hands it had fallen, one of the most powerful enemies of rising Rome, until finally subdued (B.C. 338). It became a favorite resort of the wealthy Romans, and some of the most famous remains of ancient art have been discovered among the ruins of their villas and palaces; such as the Apollo Belvedere, and the Borghese Gladiator. It was the birthplace of the emperors Caligula and Nero; and the latter constructed a splendid port by means of two moles inclosing a basin two m. in circumference. A. was completely destroyed by the Saracens during the middle ages; and it was only in the 17th c. that the modern village of PORTO D'ANZO arose, the population of which does not exceed 500.

ANTIVARI, *ăn-tē'vä-rē:* seaport 18 m. n.w. of Scutari, formerly of Albania, but on the coast-district assigned to Montenegro by the Treaty of Berlin in 1878; it has a good harbor, shut against war-ships. Pop. about 7,000.

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ANTLER, n. *ănt'lĕr* [F. *andouiller*]: a branch of a stag's horn; one of the complete horns. ANTLERED, a. *ănt'lĕrd*, furnished with antlers.

ANTLIA, n. *ănt'lĭ-ă* [L. *antlĭă*, a pump]: the spiral trunk with which butterflies and other lepidopterous insects suck up the juices of flowers. It 'is formed by the elongated slender maxillæ, still characterized by the minute palpi at their base. The inner margins of the maxillæ are concave, and the edges of the channels are in close contact, or are confluent, so as to form a canal along which the juices of the flowers can be pumped up into the mouth. The labial palpi are of large size, and defend the antlia when it is retracted and coiled 'up.'—*Owen*. In *astron.*, Antlia is an abbreviation for *A. Pneumatica* (the air-pump), one of the southern constellations introduced by Lacaille.

ANTLIATA, n. pl. *ănt-lĭ-ā'ta* [L. L. furnished with a sucker, like a pump]: name given by Fabricius to the Dipterous order of insects, from their feeding by means of a sucker or pump (see ANTLIA); but the term *antlia* is now confined to the spiral sucker of the Lepidoptera, and the use of A. as a synonym for Diptera would be misleading.

ANT-LION: the larva of an insect (*Myrmeleon formicarium*) of the order Neuroptera, remarkable for its habits, which have been carefully observed by some foremost naturalists of Europe. It inhabits sandy districts, is not known in Britain, and is more common in the s. of Europe than in the north. The perfect insect is about an inch long and has a considerable general resemblance to a dragon-fly. The larva is rather more than half an inch long; it has a very large abdomen, and a small head, which, however, is

Ant-lion,

a. larva; *b*. perfect insect.

furnished with two very large incurved mandibles. It has six legs, but is incapable of rapid locomotion, and generally moves backwards. It feeds upon the juices of insects, particularly of ants, in order to obtain which it excavates with the greatest ingenuity a funnel-shaped hole in sandy ground, and lies in wait at the bottom, all but its mandibles buried in the sand. Insects which approach too near to the edge of the hole then become its prey, by the loose sand giving

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way, so that they fall down the steep slope. If they do not fall quite to the bottom, but begin to scramble up again, the A. throws sand upon them by jerking its head, and so brings them back. It employs its head in the same way to eject their bodies from its pit, after their juices have been sucked, and casts them to a considerable distance; and by the same means throws away the sand in excavating its hole, first plowing it up with its body, and then placing it upon its head by means of one of its fore-legs. It always begins by working round the circular circumference of its future hole, and gradually narrows and deepens it; turning quite round after each time that it works round the hole, so as to employ next time the fore-leg of the other side. When it meets with a stone which it cannot remove, it deserts the excavation, and begins another. The pit is rather more than two inches deep. After about two years the larva spins its cocoon. Several species occur in the United States.

ANTOMMARCHI, *ân-tom-mar'kē*, FRANCESCO: b. Corsica, in the second half of the 18th c.: d. 1838, Apr. 3: a well-known physician, who left his situation in a hospital at Florence, to accept appointment as private physician to Napoleon Bonaparte when banished to St. Helena. The ex-emperor grew attached to him, and bequeathed him 100,000 francs. In 1821, A returned to Europe, and, 1826, published at Paris *Les Derniers Moments de Napoleon*. Afterwards he was accused of publishing as his own anatomical drawings, copies from plates by another physician. Suspicions, seemingly not ill-founded, were excited also as to the genuineness of a cast of Napoleon's head which he published in Paris. This cast purported to have been taken on Napoleon's death-bed, but was violently disputed by phrenologists. About 1836, he emigrated to America, and d. at San Antonio, Cuba.

ANTONELLI, *ân-to-nĕl'ē*, GIACOMO, Cardinal: 1806, Apr. 2—1876; b. Somnino, a village near the Pontine Marshes. His father, a woodcutter, sent A. to be educated at the Grand Seminary of Rome, where he proved himself one of the cleverest students of his time. He gained the favor of Pope Gregory XVI., who named him a *prelato*, and gave him some excellent ecclesiastical appointments. In 1841, A. became under-sec. of state to the Ministry of the Interior; in 1844, second treasurer; and in the following year, finance minister of the two Apostolic Chambers. Pope Pius IX. having become pope, 1846, raised A., during the next year, to the dignity of cardinal-deacon of St. Agatha alla Suburra. In 1848, A. was president and minister of foreign affairs in a liberal cabinet, which framed the famous *Statuto* or Constitution, proclaimed 1848, the principal articles of which were so very soon eluded. In the Ecumenical Council, which began its sittings in 1869, A. showed great tact and ability in restraining the zeal and impetuosity of his impulsive master. He died in 1876.

ANTONELLO, *ân-to-nĕl'o* (of Messina): b. in Sicily, prob. abt. 1414; d. prob. 1493: a painter prominent in the history of Italian art. In his day, the paintings of Johann

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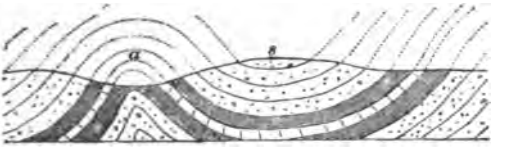
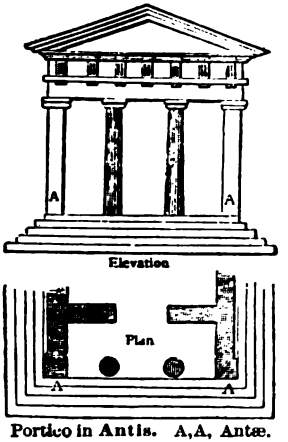


a, **Anticline**; *s*, Syncline.



Portico in Antis. A,A, Antæ.

aaa, **Anticlinal** Line; *bb*, Synclinal Line.

Antlers.—*a*, Brow-antler; *b*. Bez-antler: *c*, Antler-royal; *d*, Sur-royal or Crown antler.

Ant-lion, showing perfect insect, larva, and excavation.

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van Eyck (of Flanders) had a wide celebrity, and several specimens were brought to Naples, where A. saw one of them. Admiring the new style of oil-painting, he travelled into Flanders, and learned the secrets of the art from Van Eyck. Afterwards, he settled in Venice, and was the first Italian who painted in oil colors, in which he gave instruction to many artists. His works are now rather scarce. One, in the Museum at Berlin, bears the date 1445.

ANTONIANO, *ân-to-ne-â'no*, SILVIO: 1540–1603; b. Rome: Italian improvisatore and cardinal. He won a wide reputation by his lectures as prof. of classical literature in the College of Sapienza, Rome. In 1598 he was made cardinal. He improvised verses in all the measures of Italian poetry, and wrote a *Treatise on Education*, and a volume of *Latin Orations*.

ANTONINUS, ITINERARY OF (*Antonini Itinerarium*): a valuable geographical work, containing the names of all the places and stations on the principal and cross roads of the Roman empire, with their distances from each other in Roman miles. It has been usually attributed to the emperor M. Aurelius Antoninus, whence its name. The testimony, however, of the Greek geographer Æthicus, author of the *Cosmographia*, assures us that a general survey of the Roman empire was commenced B.C. 44 in the consulship of Julius Cæsar and M. Antoninus, and completed in the reign of Augustus, when the results of the survey received the sanction of the state. These results, it is with some probability inferred, are embodied in this *Itinerary*, which, it is further supposed, received additions and amendments in the time of the Antonines. Subsequent improvements were made down to the reign of Diocletian. The best editions are those of Wesseling (Amst. 4to, 1735), and Parthey (Berl., 1848).

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ANTONINUS, *ăn-to-nī'nŭs*, MARCUS AURELIUS, Roman emperor: 121, Apr. 20—180, Mar. 17 (reigned 20 yrs.); b. Rome; son of Annius Verus and Domitia Calvilla. His original name was Marcus Annius Verus. On the death of his father, he was adopted by his grandfather, who spared no pains to render him pre-eminent in every art and science. His fine qualities early attracted the notice of the emperor Hadrian, who used to term him, not *Verus*, but *Verissimus*, and who conferred high honors on him, even while a child. When only seventeen years of age, he was adopted, with Lucius C. Commodus, by Antoninus Pius, the successor of Hadrian; and Faustina, the daughter of Pius, was selected for his wife. In the year 140 he was made consul; and from this period to the death of Pius, in 161, he discharged the duties of his various offices with the greatest promptitude and fidelity. The relation between him and the emperor was most warm and familiar. On his accession to the throne, he strikingly illustrated the magnanimity of his character, by voluntarily sharing the government (which Pius had left in his last moments, and the senate offered to him *alone*) with young Commodus, who henceforth bore the name of Lucius Aurelius Verus, and to whom he gave his daughter Lucilla in marriage. Towards the close of 161, the Parthian War broke out, and Lucius, a young man of vigorous bodily habits, was sent to the frontiers of the empire, to repel the incursions of the barbarians; but intoxicated with the enervating pleasures of the East, he obstinately refused to go beyond Antioch, and intrusted the command of the army to his lieutenant Cassius, who gained several brilliant victories. Lucius returned to Rome (166), and enjoyed a triumph to which he had no real claim; for all the great achievements of the war were accomplished by his officers, while he was revelling in the most extravagant licentiousness. In the mean time, Marcus Aurelius had distinguished himself by the prudence and energy with which he administered affairs at home. A formidable insurrection had long been preparing in the German provinces; the Britons were on the point of revolt, and the Catti waiting for an opportunity to devastate the Rhenish provinces. Within Rome itself raged a pestilence, believed to have been brought home by the troops of Lucius; frightful inundations and earthquakes had laid large portions of the city in ruins, destroyed the granaries in which were kept the supplies of corn, and thus created almost universal distress, which stimulated to an incalculable degree the terror which the citizens entertained of their savage enemies. To allay the popular perturbation, Marcus resolved to go forth to the war himself. Hecatombs were offered to the offended gods, and the Roman legions set out for the north. Marcus and Lucius were, for the time, completely successful. The pride of the Marcomanni, and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube, was humbled, and they were compelled to sue for peace in 168. In the year 169 Lucius died. The contest was renewed in 170, and may be said to have continued with little intermission during the whole life of the emperor. Although fond of peace, both from natural

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disposition and philosophic culture, he displayed the sternest vigor in suppressing the revolts of the barbarians; but in order to accomplish this, he had to enrol among his soldiery vast numbers of gladiators and slaves, for his army had been thinned by the ravages of the plague. His headquarters were Pannonia, out of which he drove the Marcomanni, whom he subsequently nearly annihilated in crossing the Danube. The same fate befel the Jazyges; but the most famous as well as the most extraordinary of all his victories, was the miraculous one gained over the Quadi (174), which gave rise to copious discussion among Christian historians and others. Dion Cassius's account is, that the Romans were perishing of thirst in the heat of summer, when suddenly the cloudless sky darkened, and abundant showers fell, of which the soldiers were taking advantage when the barbarians attacked, and would have cut them to pieces, if a storm of hail and fire had not descended on the former. That some extraordinary phenomenon occurred is evident, for there is a letter of Aurelius still extant in which he commemorates the event; and the emperor was a man incapable of uttering a falsehood, not to mention that there was an entire army living to disprove the statement, if untrue. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission and obtain clemency; but the practical advantages that might have resulted from it were nullified by a new outbreak in the east, occasioned through the infamous treachery of his own wife, which demanded his presence, and though suffering from failing health, he was obliged to leave Pannonia. Before his departure, however, he learned that the ambitious governor, Avidius Cassius, who had rebelled against him and seized the whole of Asia Minor, had perished by assassination. The conduct of Marcus Aurelius on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the Fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. Like Cæsar in similar circumstances, but in a more purely humane spirit, he received the head of his murdered adversary with quite opposite feelings to what had been anticipated, rejecting the bloody gift with all the loathing of a benevolent nature, and even shrinking from the presence of the murderers. On his arrival in the east, he exhibited the same illustrious magnanimity. He burned the papers of Cassius, without reading them, so that he might not be at liberty to suspect any as traitors; treated the provinces which had rebelled with extreme gentleness; disarmed the enmity and dispelled the fears of the nobles who had openly favored his insurgent lieutenant. While pursuing his work of restoring tranquillity, Faustina died in an obscure village at the foot of Mount Taurus; and her husband (and this was, perhaps, the single frailty of his character), though undoubtedly conscious of her glaring profligacy and infidelity, paid the most lavish honors to her memory.

On his way home, he visited Lower Egypt and Greece, displaying everywhere the noblest solicitude for the welfare

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of his vast empire, and drawing forth from his subjects, who were astonished at his goodness, sentiments of the profoundest admiration and regard. At Athens, which this imperial pagan philosopher must have venerated as a pious Jew did the city of Jerusalem, he showed a catholicity of intellect worthy of his great heart, by founding chairs of philosophy for each of the four chief sects—Platonic, Stoic, Peripatetic, and Epicurean. No man ever labored more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Towards the close of the year 176, he reached Italy, and celebrated his merciful and bloodless triumph, Dec. 23. In the succeeding autumn he departed for Germany, where fresh disturbances had broken out among the restless and volatile barbarians. He was again successful in several sanguinary engagements; but his originally weak constitution, shattered by perpetual anxiety and fatigue, at length sunk, and he died either at Vienna, or at Sirmium, after a reign of 20 years.

Marcus Aurelius A. was the flower of the stoical philosophy. It seems almost inexplicable that so hard and crabbed a system should have produced as pure and gentle an example of humanity as the records of heathen—we had almost said, Christian—history can show. Perhaps, as a modern philosophic theologian suggests, it was because stoicism was the most solid and practical of the philosophic theories, and the one which most earnestly opposed itself to the rapidly-increasing licentiousness of the time, that the chaste heart of the youth was drawn towards it. At 12 years of age, he avowed himself a follower of Zeno, Epictetus, etc. Stoics were his teachers—Diognotus, Apollonius, and Junius Rusticus; and he himself is considered one of the most thoughtful teachers of the school. Oratory he studied under Herodes Atticus and Cornelius Fronto. His love of learning was insatiable. Even after he had attained to the highest dignity of the state, he did not disdain to attend the school of Sextus of Chæronea. Men of letters were his intimate friends, and received the highest honors both when alive and dead. His range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. Nor must we forget that these were cultivated not merely in the springtime of his life, when enthusiasm was strong, and experience had not saddened his thoughts, and when study was his only labor, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an empire. The man who loved peace with his whole soul died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained uncorrupted to the end of his noble life his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, every Roman citizen, and many others in distant portions of the empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object

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of worship, and was believed to appear in dreams, like the saints of subsequent Christian ages.

There is one feature in his character, however, which it would be dishonest to pass over—his hostility, namely, to Christianity. He was a persecutor of the new religion, and, it is clearly demonstrated, was cognizant, to a certain extent at least, of the atrocities perpetrated upon its followers. Numerous explanations have been offered of his conduct in this matter. The most popular one is, that he for once allowed himself to be led away by evil counselors; but a deeper reason is to be found in that very earnestness with which he clung to the old heathen faith of his ancestors. He believed it to be true, and to be the parent of those philosophies which had sprung up out of the same soil; he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition, and a mysterious political conspiracy, was secretly spreading throughout the empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms. It was, therefore, comparatively easy, even for so humane a ruler, to imagine it his duty to extirpate this unnaturally hostile sect. Mr. John Stuart Mill finds in this tragical error of the great emperor a most striking warning against the danger of interfering with the liberty of thought. What he says is so completely in harmony with the above conception of the motives of Marcus Aurelius, and is in itself so eloquent, that no apology is required in quoting the passage: "If ever any one possessed of power had grounds for thinking himself the best and most enlightened among his contemporaries, it was the emperor Marcus Aurelius. Absolute monarch of the whole world, he preserved through life not only the most unblemished justice, but what was less to be expected from his stoical breeding, the tenderest heart. The few failings which are attributed to him were all on the side of indulgence; while his writings, the highest ethical product of the ancient mind, differ scarcely perceptibly, if they differ at all, from the most characteristic teachings of Christ. This man, a better Christian, in all but the dogmatic sense of the word, than almost any of the ostensibly Christian sovereigns who have since reigned, persecuted Christianity. Placed at the summit of all the previous attainments of humanity, with an open, unfettered intellect, and a character which led him, of himself, to embody in his moral writings the Christian ideal, he yet failed to see that Christianity was to be a good and not an evil to the world, with his duties to which he was so deeply penetrated. Existing society he knew to be in a deplorable state. But such as it was, he saw, or thought he saw, that it was held together, and prevented from being worse, by belief and reverence of the received divinities. As a ruler of mankind, he deemed it his duty not to suffer society to fall in pieces, and saw not how, if its existing ties were removed, any others could be formed which could again knit it together. The new religion aimed openly at dissolving these ties: unless, therefore, it was his duty to adopt that re-

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ligion, it seemed to be his duty to put it down. Inasmuch, then, as the theology of Christianity did not appear to him true, or of Divine origin; inasmuch as this strange history of a crucified God was not credible to him, and a system which purported to rest entirely upon a foundation to him so wholly unbelievable, could not be foreseen by him to be that renovating agency which, after all abatements, it has in fact proved to be; the gentlest and most amiable of philosophers and rulers, under a solemn sense of duty, authorized the persecution of Christianity. To my mind, this is one of the most tragical facts in all history. It is a bitter thought, how different a thing the Christianity of the world might have been if the Christian faith had been adopted as the religion of the empire, under the auspices of Marcus Aurelius, instead of those of Constantine. But it would be equally unjust to him, and false to truth, to deny, that no one plea which can be urged for punishing anti-Christian teaching, was wanting to Marcus Aurelius for punishing, as he did, the propagation of Christianity. No Christian more firmly believes that atheism is false, and tends to the dissolution of society, than Marcus Aurelius believed the same things of Christianity; he who, of all men then living, might have been thought the most capable of appreciating it. Unless any one who approves of punishment for the promulgation of opinions flatters himself that he is a wiser and better man than Marcus Aurelius—more deeply versed in the wisdom of his time—more elevated in his intellect above it—more earnest in his search for truth—let him abstain from that assumption of the joint infallibility of himself and the multitude, which the great A. made with so unfortunate a result.'—See Renan's *Marc Aurèle* (1882).

ANTONINUS, WALL OF (*Antonini Vallum*): a barrier erected between the Firths of Forth and Clyde by the Romans, in the reign of Antoninus Pius, to restrain the encroachment of the native tribes. A fragment of a Roman pillar, formerly in the Univ. of Edinburgh, fixes its date at 140. The superintendence of the work is generally attributed to the imperial legate Lollius Urbicus. Its length was about 27 English m.; the e. termination being, according to two different suppositions, at Carriden, or at Kinniel, on the Forth; the w. at Old Kilpatrick, or at Dunglass Castle, on the Clyde. The work consisted of a ditch about 20 ft. deep and 40 wide, a rampart of earth and stone about 20 ft. high and 24 ft. thick at the base, and on the inner or s. side of the rampart a paved military road. It was protected by a chain of nineteen forts, with watch-towers between. The line of the wall may still be traced to a considerable extent. The most perfect fragments are at Elf Hill, on the moor of Bonnieside, about a mile and a half from Castlecary; within the park of Callander House, near Falkirk; and on the slopes at Inveravon, not far from the railway station at Polmont. It is commonly designated *Graham's Dike*—a name given to more than one ancient ditch and rampart in England. See SEVERUS, WALL OF. For best accounts of the Wall of Antonine, see Roy's *Mili-*

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tary Antiquities of the Romans in North Britain (1793), and Stuart's *Caledonia Romana* (2d ed., 1852).

ANTONINUS PIUS, *ăn-tō-nī'nus pī'us*, TITUS AURE'LIUS FULVUS, Roman emperor: 86–161 (reigned 138–161) b. in the reign of Domitian. The family of A. was originally from Nemausus, now Nîmes, in Gaul. A. inherited great wealth, and early showed excellent qualities. In 120, he was made consul; afterwards was sent by Hadrian as proconsul into Asia, where the wisdom and gentleness of his rule won for him a higher reputation than had been gained by any of his predecessors. By his wife Faustina he had four children, of whom three died, leaving a daughter, Faustina, afterwards wife of Marcus Aurelius. In 138, he was adopted by the emperor Hadrian, in consequence of merit alone, and came to the throne in the same year. The reign of A. was proverbially peaceful and happy. In his private character he was simple, temperate, and benevolent; while in public affairs he acted as the father of his people. The persecution of Christians, which was continued during his reign, was partly stayed by his mild measures. He was little engaged in war, excepting in Britain, where he extended the power of Rome, and built a wall between the Forth and the Clyde, as a defense against invasions by the predatory inhabitants of the north; but he was frequently employed in arbitration and general counsel on the affairs of foreign states. 'Happy the nation which has no history.' The reign of A. illustrates this saying, for by the justice, wisdom, kindliness, and courtesy of the emperor, his vast empire was preserved from the crimes, conspiracies, insurrections, and bloodshed, the recording of which formed the largest part of the historian's work in the dark centuries of the Roman empire. It is said that only *one* senator was

Copper Coin of Antoninus Pius, commemorative of his victories in Britain. From one in the British Museum.

impeached during A.'s lifetime. Literature received great encouragement; the laws were improved; commerce extended, the means of communication were facilitated by the repair of roads, bridges, etc.; new sanitary regulations were introduced, and a taste for architecture fostered in the citizens. The epithet PIUS was conferred on him on account of his conduct in defending the memory of his predecessor Hadrian against certain dishonoring measures brought for-

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ward by the senate. The column raised to A.'s memory by his adopted son and successor, Marcus Aurelius Antoninus (q.v.), was discovered in 1709, and now exists only in fragments. The so-called Pillar of Antoninus, now in the *Piazza Colonna* at Rome, is that raised by the senate in honor of Marcus Aurelius, after his victory over the Marcomanni.

ANTONIUS, *ăn-tō'nĭ-ŭs*, MARCUS (MARK ANTONY), the Roman triumvir: B.C. 83–30; descendant of one of the oldest patrician families; son of the prætor M. Antonius Creticus, and on the side of his mother Julia, related to Julius Cæsar. His youth was wasted in dissipation, and finding himself pressed by numerous impatient creditors, he escaped to Greece in B.C. 58, where for a short time, he listened to the teaching of Athenian philosophers and orators. His studies here were soon interrupted by the proconsul Gabinius, who appointed him leader of his cavalry. In the campaign against Aristobulus in Palestine, and in Egypt, A. distinguished himself by his courage and activity, and ingratiated himself with the soldiers. After assisting Cæsar in Gaul, he went to Rome in 50, to advance the interests of the former, who stood in great danger from the hostility of the oligarchical party, and was appointed an augur, and chosen one of the tribunes of the people. In the following year, on account of his adherence to the party of Cæsar, he was expelled from the curia, and fled to Cæsar, who made use of this event as a pretext for his war against Pompey. At the outbreak of this war, A. received the appointment of commander-in chief in Italy. In the battle of Pharsalia, he commanded the left wing of Cæsar's army. In 47, he was made master of the horse by Cæsar, who left him to govern Italy during his absence in Africa. Antony, as usual, disgraced himself; was perpetually drunk; divorced his wife, and married an actress, with whom he paraded offensively through the chief towns of the peninsula. In 44, he married Fulvia, the widow of Clodius; was made consul, and vainly endeavored to prevail on the Romans to recognize Cæsar as emperor. After the assassination of Cæsar, he played the part so well described by Shakespeare; and by his funeral oration, and the well-timed display of Cæsar's bloody robe, so wrought on the passions of the people, that the conspirators were compelled to escape from Rome, leaving the successful orator for a while in possession of almost absolute power. A. was then occupied in disputes and reconciliations with Octavianus (Cæsar's heir), besieging Mutina, and then denounced by Cicero as an enemy of the state. In 43, his troops were defeated at the battle of Mutina, when he escaped beyond the Alps; visited the camp of Lepidus, who commanded in Gaul; and gained the favor of the army, of which he took the command. Plancus and Pollio joined him with their troops; and A., who so recently had escaped as a helpless fugitive from Italy, returned to Rome at the head of seventeen legions and 10,000 cavalry. Octavianus, who had pretended to maintain republican principles, now threw off the mask, and held a consultation with A. and Lepidus on the island of Reno

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(or Lavino), near Bologna, when it was determined that these triumviri should share the whole Roman world among themselves. To secure their spoil, they returned to Rome, and began their course of murder and robbery throughout Italy. Among their first victims fell Cicero, the orator whose eloquence they dreaded. According to Appian, not less than 300 senators and 2,000 knights fell under the power of the triumviri. After making Italy safe for themselves, and raising an enormous sum of money to carry on their war abroad, A. and Octavianus led their troops into Macedonia against Brutus and Cassius, and defeated the republican forces. A. next visited Athens, and then went into Asia, to arrange his dispute with Cleopatra, queen of Egypt, whose conduct had offended the triumviri. The queen herself appeared to answer his challenge, and captivated A. by her beauty and address. The general who had overcome Brutus and Cassius was now made a prisoner, though not of war. He followed Cleopatra into Egypt, and lived with her in idleness and luxury, until he was aroused by tidings of the quarrel which had taken place in Italy between his own relatives and Octavianus. This dispute gave rise to a short war, which came to an end before A. arrived in Italy. A new division of the Roman world now took place between the triumviri, and was soon quietly arranged at Brundusium. A. took the east, and Octavianus took the west; while the ambition of the feeble Lepidus was appeased by his having the whole of Africa for his portion. Even this shadow of dominion was taken from him in 36. Meanwhile A. had confirmed his friendship with Octavianus by a marriage with Octavia, his sister. He now returned to Cleopatra, resumed his former voluptuous mode of life, squandered the wealth of Rome in gifts to his royal mistress, and became guilty of gross injustice. Octavianus made use of these facts to excite the indignation of the Roman people against A., and a war between the rivals became unavoidable. A., in his idleness, tried to postpone the trial of strength which he saw inevitably approaching, and filled the island of Samos (where his troops were quartered) with musicians, jugglers, and buffoons. Meanwhile, at Rome, he was deposed from the triumvirate, and war was proclaimed against Cleopatra. Each party collected its forces, and in the naval engagement which took place (31), near Actium (q.v.) A. was defeated. His subsequent hope of finding troops still faithful to him in Libya was disappointed. He returned to Egypt, where, with Cleopatra, he once more forgot political cares and vexations, until his amusements were suddenly interrupted by the arrival of Octavianus at Alexandria. A. now roused himself, made a charge with his cavalry, and repelled his enemy; but the advantage was only momentary. Deserted by the Egyptian fleet, as by his own army, and suspecting that even Cleopatra had conspired against him, he went to her palace, from which the queen had escaped. Deceived by a false message informing him of the death of Cleopatra, A. committed suicide by falling upon his sword.

ANTONIUS. or ANTONY OF PADUA, SAINT; 1195, Aug

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15—1231, June 13; b. Lisbon: on his father's side, related to Godfrey of Bouillon. He was first a monk of the Augustine order, but in 1220 he entered the Franciscan order, and soon became one of its most active propagators. On his missionary voyage to Africa, being cast on the coast of Italy, he preached with great success at Montpellier, Toulouse, Bologna, and Padua, where he died. The legends of A. abound in marvels, such as that his eloquence as preacher was so great, that even the fish in the sea were deeply affected by it! His anniversary is June 13. His monument, a fine work of statuary, is in the church which bears his name at Padua.

ANTONOMASIA, *ăn'tŏ-nŏ-mā'zĭ-ă:* a rhetorical figure in which an epithet is substituted for a proper name; e.g. 'the Stagyrite' for Aristotle. Or the process may be reversed; e.g. when a very rich man is called 'a Crœsus.' This figure has a resemblance to metonymy.

ANTON ULRICH, *ăn'ton ool'rik:* 1714–80 (supposed): second son of Duke Ferdinand Albert of Braunschweig-Wolfenbüttel (till 1735, Braunschweig-Bevern, the title by which the prince was first known in Russia. When the Russian empress Anna was looking out for an alliance for her niece, Anna Carlovna, princess of Mecklenburg-Schwerin, the influence of Austria led her to choose A. U. Accordingly, he came to Russia in 1733, was appointed colonel of a cuirassier regt., and placed in the receipt of a considerable pension. The marriage was, however, long delayed. The princess showed a decided distaste for the insignificant character of the bridegroom-elect, and married him only to avoid a still more hated union with the son of Biron. The birth of the prince Ivan took place in 1740, a year after the marriage. About the same time, the empress falling dangerously sick, appointed the infant prince her successor, and Biron regent. After her death, A. U. made some feeble attempts to reverse this appointment, which only led to the punishment of those supposed to have instigated them, and to his own military degradation. Biron's conduct towards the parents of the infant prince becoming unbearably insolent, Anna appealed in despair to Gen. Münnich, who put a sudden end to Biron's sway, and declared the grand-duchess and her husband regents. After a few months, Anna ungratefully overthrew Münnich. After his fall, as little unity prevailed between the ministers at the helm as between herself and her husband, and the government was looked upon as both foreign and contemptible. Then came the revolution of 1741, Dec. 5, which in one night raised Elizabeth (q.v.) to the throne. A. U. and his consort were exiled, and lived long at Cholmogory, in the government of Archangel. Three children were born to them in exile. Anna died in 1746. Catharine II. offered A. U. his freedom, but he declined it. Ultimately, he grew blind. The exact year of his death is uncertain. Catharine offered his children an asylum in Jutland.

ANTONY, *ăn'to-nĭ,* SAINT, surnamed THE GREAT (also ANTONY OF THEBES), the father of monachism.

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abt. 251–356, Jan. 17; b. Koma, near Heraklea, Upper Egypt. His parents were wealthy and pious. Having, in obedience to what he believed to be a divine injunction, sold his possessions, and distributed the proceeds among the poor, he withdrew into the wilderness, where he disciplined himself in all those austerities which have hallowed his memory in the Rom. Cath. Church, and formed the model of the monastic life. When 30 years of age, however, desirous of obtaining a deeper repose than his situation afforded, he penetrated further into the desert, and took up his abode in an old ruin on the top of a hill, where he spent 20 years in the most rigorous seclusion; but, in 305, he was persuaded to leave this retreat by the prayers of numerous anchorites, who wished to live under his direction. He then founded the monastery of Faïoum, at first only a group of separate and scattered cells near Memphis and Arsinoë; which may be considered the origin of cenobite life. The persecution of the Christians by Maximian in 311, induced St. A. to leave his cell and go to Alexandria, in the hope of obtaining the crown of martyrdom, but having failed in this, he returned to his solitude in the course of a year, which, however, he soon left, plunging yet deeper into the desert. At length he found a lodgment on a hill, about a day's journey from the Red Sea; but his disciples discovering his retreat, so pressed him with their affectionate importunities, that he ventured to accompany them back. After many pious exhortations, he once more left them, and soon became the mighty oracle of the whole valley of the Nile. In 355, the venerable hermit, then 104 years of age, made a journey to Alexandria to dispute with the Arians. He had interviews with Athanasius and other distinguished persons; but feeling his end approaching, he retired to his desert home, where he died.

Athanasius states, in his *Life of St. A.*, that the saint wore only a coarse shirt of hair, and never washed his body, which is more credible than the stories that he relates of his encounters with the devil, or his miracles. His whole conduct indicates the predominance of a glowing and yet gloomy fancy—the proper condition of religious asceticism. Although the father of monachism, St. A. is not the author of any monastic 'rules'; those which the monks of the eastern schismatic sects attribute to him are the production of St. Basil. He is perhaps the most popular saint in the Rom. Cath. Church. Accounts of his life and miracles are given in the *Acta Sanctorum* of the Bollandists, under date Jan. 17, on which day his festival was kept.

St. Anthony's Fire.—The Rev. Alban Butler, in his *Lives of the Saints*, gives the following account of the origin of this name: 'In 1089, a pestilential erysipelatous distemper, called the *sacred fire*, swept off great numbers in most provinces of France; public prayers and processions were ordered against this scourge. At length, it pleased God to grant many miraculous cures of this dreadful distemper, to those who implored His mercy through the intercession of St. A., especially before his relics; the church [of La Motte St. Didier, near Vienne, in Dauphiné] in which they were deposited was resorted to by great numbers of pilgrims,

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and his patronage was implored over the whole kingdom against this disease.' The 'Order of Canons Regular of St. Anthony,' a religious fraternity, founded about 1090, for the relief of persons afflicted with the fire of St. A., survived in France till 1790.

ST. ANTHONY'S WELL, a small fountain near the ruined chapel of St. A., on the n. slope of Arthur's Seat (q.v.), near Edinburgh. This interesting fountain, which consists only of a stone basin, into which water trickles from under an incumbent rock, is celebrated in the Scottish song, '*O, waly, waly.*'

ANTRAIGUES, *ŏn-trāg'*, EMANUEL-LOUIS-HENRI DELAUNAY, Comte D': 1755–1812; b. Vivarais, dept. Ardèche: a great politician, but very ambiguous character. He was educated under the Abbé Maury. His superior talents were shown first in his *Mémoire sur les Etats-généraux, leurs Droits et la Manière de les convoquer* (1788). This book, full of daring assertions of liberty, was one of the first sparks of the fire which afterwards flamed in the French Revolution. In 1789, when A. was chosen as a deputy, he not only defended the privileges of the hereditary aristocracy, but also ranked himself with those who opposed the union of the three estates; while in the discussions on the constitution, he maintained that the royal *veto* was an indispensable part of good government. After leaving the assembly in 1790, he was employed in diplomacy at St. Petersburg and Vienna, where he defended the cause of the Bourbons. In 1803, he was employed under Alexander of Russia in an embassy to Dresden, where he wrote against Bonaparte a brochure entitled *A Fragment of the 18th Book of Polybius, discovered on Mount Athos.* He afterwards went to England, and acquired great influence with Canning. Despite his attachment to the interest of the Bourbons, he could never win the confidence of Louis XVIII. In 1812, he was murdered, with his wife, at his residence near London, by an Italian servant, who, immediately afterwards, commited suicide.

ANTRE, n. *ăn'tĕr* [L. *antrum*, a cave]: in *poetry*, a cavern; a den.

ANTRIM, *ăn'trĭm:* maritime county in the n.e. of Ireland, province of Ulster; bounded, n. by the Atlantic; w. by the n. part of the river Bann, dividing it from Londonderry, and by Lough Neagh; s. by Lagan river, separating it from the county of Down; s.e. by Belfast Lough; and e. by the Irish Channel. It stands third among the Irish counties in population, but in extent only ninth. Its greatest length is 56 m.; its greatest breadth, 30; its extent of sea-coast, 90 m.: 1164 sq. miles. About two-thirds of this is arable; a fourth barren; and a seventy-fourth in woods. Off the n. coast lie Rathlin Isle and the Skerries; and off the e. coast, the Maiden Rocks; the e. coast is hilly; and from Larne to Fair Head, parallel mountain-ranges of no great height, and covering a third of the county, stretch s.w. into the interior, forming valleys opening seaward, called the Glens of Antrim. The interior slopes towards Lough Neagh. The highest eminences are—Trostan, 1,810 feet, and Slievemish, or Slemish, 1,782 feet. The principal streams are—the Bann,

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from Lough Neagh to the Atlantic; the Main, running parallel to the Bann, but in the reverse direction, into Lough Neagh; and the Bush, flowing n. into the Atlantic. Peat-bogs are numerous. Six-sevenths of the surface consist of basaltic trap, often alternating with red ochre, and overlying hardened chalk, green-sand, new red sandstone, and mica-slate. The surface and edges of the trap-field, in some places, present basaltic columns of varied outlines. The green-sand and new red sandstone crop out on the e. and s.e. borders, and millstone grit occurs in the n.e. Between Ballycastle and the mouth of the Bann, the basalt assumes very picturesque forms; and the Giants' Causeway is one of the most perfect examples of columnar basalt in the world. Fine salt mines occur at Duncrue and Carrickfergus; and small coal-fields near Ballycastle, and in the interior. Rich beds of iron ore of fine quality have been recently opened in Glenravel, and a large export has been carried on from Cushendall and Carnlough. The soil of A. is mostly light, and the chief crop is oats. In 1882, 243,831 acres were under crop, 77,847 being in oats, 44,974 in potatoes, and 4,504 in wheat. The land is very much subdivided; and the rearing of flax, and the various branches of the linen, cotton, and coarse woolen manufacture, employ a great portion of the people. In 1881, there were upwards of 95,000 pupils on the rolls of the national schools in the county (23,000 being Rom. Catholics). The principal towns are Belfast, Lisburn, Ballymena, Ballymoney, Carrickfergus, Larne, and Antrim. Before 1885, County A. returned two members to parliament; Belfast borough, two; and Carrickfergus and Lisburn boroughs, each one; but since 1885 it returns eight members, of whom four represent the city of Belfast. Nearly one-half of the inhabitants are Presbyterians, the county having been extensively colonized from England and Scotland. The original possessors were the O'Neills, who, partially dispossessed by John de Courcy, reappeared on the failure of his line, regained nearly the whole of the country, and kept it till the forfeiture of Shane O'Neill. Pop. (1851) 352,264; (1851) 368,948; (1871) 404,015; (1881) 421,943, of whom nearly 190,000 were Presb., 108,000 Rom. Cath., and 98,000 Prot. Episcopalians; (1891) 471,179.

ANTRORSE, a. *ăn-trŏrs'* [L. *ante*, before; *versus*, turned]: in *bot.*, having an upward direction towards the summit of some part.

ANTWERP, *ănt'wĕrp* (in French, ANVERS, *ŏn-vair'*): cap. of the prov. which bears its name, and the chief commercial city of Belgium; on the river Scheldt. Its chief public institutions are the Acad. of Sciences, Acad. of Painting and Sculpture, formerly known as the Acad. of St. Mark, a Medical and Surgical School, Naval Arsenal, Museum, and Zoological Gardens. The cathedral, one of the noblest Gothic structures in Europe, is 500 ft. in length by 240 in breadth, with a roof supported by 125 pillars, and a very lofty spire. The interior is enriched by the two greatest of all the pictures of Rubens, *The Elevation of the Cross*, and *The Descent from the Cross*. The Church of St. James contains the monument of the Rubens family. The

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new fortifications, recently erected, render this commercial capital of Belgium one of the most strongly fortified places in Europe. The trade and manufactures of A. have recently greatly extended, and the large dock and quay accommodation having been found too limited, steps have been taken for making a new quarter of the town, with ample harbor-room, on the opposite side of the Scheldt. The manufactures consist chiefly of sugar, white-lead, cotton goods, point-lace, linen thread, carpets, gold and silver lace. It is celebrated for its sewing-silk, black silk stuffs, and printer's ink, as it was in former times for its velvets, damasks, and satins. There are also to be mentioned tobacco manufacture, the cutting of diamonds and other precious stones, and shipbuilding.

A. is mentioned as early as the 8th c.; in the 12th and 13th it gave signs of considerable prosperity, and in 1550 numbered more than 200,000 inhabitants. The union of Belgium with Holland in 1815 was very favorable to the commerce and general prosperity of A. By the revolution, 1830, Aug., it was linked to the destiny of Belgium. When the revolutionary party gained possession, the commandant, Gen. Chassé, retreated to the citadel, and, exasperated by the breach of truce, commenced a bombardment, which destroyed the arsenal and about thirty houses. In 1832, a French army of 50,000 men, under Marshal Gérard, appeared before A., to demand the surrender of the citadel, which Gen. Chassé refused. After the interior of the citadel had been reduced to ruins by the French artillery, Gen. Chassé capitulated; the Flemish fortification, and the forts Burght, Zwindrecht, and Austroweel were surrendered to the Belgian troops, and the Dutch troops were taken to France, as hostages for the surrender of the forts Lillo and Liefkenshoek, according to an article in the negotiation of 1831, Nov. 15, which stipulated that the five citadels held by the Dutch troops in Belgium should be surrendered. Pop. (1894) 256,620.

ANUBIS, n. *ă-nū'bĭs:* an Egyptian deity, styled Anepu on hieroglyphic monuments; according to mythology, the son of Osiris and Nephthys. By the Greeks, he was frequently styled Hermes or Hermanubis, combining the Egyptian with the Grecian name. He is represented on monuments as having the head of a jackal, with pointed ears and snout, which the Greeks frequently changed to those of a dog. Sometimes he is seen wearing a double crown. A white and yellow cock was sacrificed to him. His office, like that of Hermes Psychopompus among the Greeks, was to accompany the ghosts of the deceased into Hades (Amenthes), and there to assist Horus in weighing their actions, under the inspection of Osiris. As, in the time of the Romans, the Egyptian worship had spread beyond Egypt itself, the two conceptions of A. and Hermes were blent together, and the dog's head of the former was found united to the insignia of the latter.

Anubis.

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ANUPSHUHUR, *an-ŭp-shuh-hĕr'*: town of India, in the British dist. of Bolundshuhur, Northwest Provinces, on the right bank of the Ganges, 73 m. e. from Delhi, on the route to Bareilly. The channel of the Ganges is here about a mile wide, but only about one-fifth of that space is occupied by the stream in the dry season. The town is ill built and crowded, the houses either of mud or ill-cemented brick. Pop. (1871) 10,644.

ANUS, n. *ā'nŭs* [L.]: term applied by anatomists to the lower or (in the case of animals) the posterior aperture of the intestinal canal; the rectum terminating externally in the anus. With regard to its anatomy, it is sufficient to state that it is kept firmly closed on ordinary occasions by the *external* and *internal sphincter* muscles, the former of which contracts the integument around the opening, and, by its attachment to the coccyx behind, and to a tendinous centre in front, helps the *levator ani* muscle in supporting the aperture during the expulsive efforts that are made in the passage of the fæces or intestinal evacuations; while the latter, or *internal sphincter*, is an aggregation of the circular muscular fibres of the lowest part of the rectum, and acts in contracting the extremity of the tube. The main function of the *levator ani* muscle is expressed in its name it being the antagonist of the diaphragm and other muscles which act in the expulsion of the fæces. The integument around the anus lies in radiating plaits, which allow of its stretching without pain during the passage of the fæces; and the margin is provided with a number of sebaceous glands, which, in some of the lower animals, secrete strongly odorous matters. See ANAL GLANDS. Infants are occasionally born with an imperforate *anus*, or congenital closure of the rectum. In the simplest form of this affection, the anus is merely closed by thin skin, which soon becomes distended with the Meconium (q.v.). More complicated cases are those (1) in which the gut terminates some distance above the seat of the anus in a blind sac or pouch; (2) where the rectum terminates in the bladder, etc. Fortunately, the closure by a layer of skin is far the most common form of imperforate anus, and the little patient is at once relieved by a very simple surgical operation. If, however, no treatment be adopted, too often the case in consequence of a popular delusion that the affection is incurable, the abdomen becomes distended and hard, vomiting comes on, the vomited matters soon assume a fæcal smell, and the infant dies in a few days, either from exhaustion or rupture of the intestines.

Spasm of the Sphincter Ani is by no means a rare affection; it is characterized by violent pain of the anus, with difficulty in passing the fæces. On attempting an examination, the muscle feels hard, and resists the introduction of the finger. It usually occurs in sudden paroxysms, which soon go off: but sometimes it is of a more persistent character. Its causes are not clearly known, and although most surgeons regard it as a special affection, some consider that the spasm is not a disease in itself, but merely a symptom of some slight excoriation or ulceration. Suppositories containing opium or belladonna, introduced during the period of relaxa-

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tion, are sometimes of use; and if there are ulcers, they must be specially treated. *Ulceration* occurring as a breach of surface at one or more points around the anus, but not extending within the orifice, is by no means uncommon in persons who are not attentive to cleanliness, and especially in women with vaginal discharges. Strict attention to cleanliness, the patient being directed to apply warm water to the parts at least twice daily with a sponge (which after each operation should be carefully rinsed out), and one or two applications of the solid nitrate of silver, followed by black-wash, will effect a speedy cure. If the ulcer is seated partly *without* the anus and partly *within* the rectum, the distress is much more severe, and the treatment often requires the use of the knife. *Fissure of the anus* is a term applied to an affection consisting in one or more cracks, excoriations, or superficial ulcerations, situated between the folds of the skin and mucous membrane at the verge of the anus, and only slightly involving the rectum. They give rise to intense pain during the passage of the evacuations, and for some hours afterwards to great discomfort, smarting, and itching. The treatment to be adopted is to endeavor to procure regular and somewhat soft evacuations, and to sponge with warm water immediately afterwards, the parts being dried with a soft cloth. One or two applications of solid nitrate of silver will sometimes cure the disease; and an ointment of oxide of zinc, or one containing chloroform, will sometimes serve to allay the irritation and heal the parts.—*Pruritus ani*, which simply means intense itching and irritation of this part, is to be regarded as a symptom of certain morbid changes rather than as a special disorder; but is very common, and productive of much suffering. It is often associated with an unhealthy state of the intestinal secretions, or with simple constipation; with a congested state of the mucous membrane; with a disordered condition of the womb; with the presence of thread worms in the rectum, etc.; and it is peculiarly common in persons whose occupations are sedentary. The affection is often much aggravated by the patient's being unable to refrain from scratching the parts, which leads to excoriations, ulcerations, thickening of the skin, etc. The symptoms are usually most severe when the sufferer begins to get warm in bed. If the affection arise from worms, or a loaded state of the large intestines, enemata and purgatives will give immediate relief. If unhealthy excretions exist, attention must be paid to the diet, and the occasional administration of a pill containing some alterative and aperient as may be advised until relieved, together with the local application of soap and water to the parts, will often stop the itching. If there are any cracks or ulcers, nitrate of silver must be applied until they heal. To prevent the reappearance of these sores, the patient should bathe the parts night and morning with a strong solution of alum. An ointment composed of a drachm of calomel and an ounce of lard is strongly recommended by Mr. Smith, of King's College Hospital, when other means have failed; who also states that the daily introduction of a well-oiled bougie, made of black wax, will

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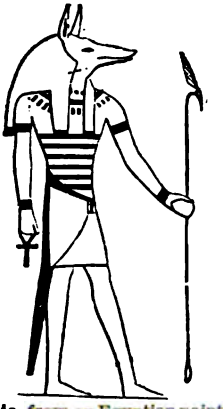

Anubis, from an Egyptian painting.

Anvil.

Antwerp Cathedral.

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sometimes succeed in very obstinate cases. For other principal affections of the anus, see FISTULA: PILES: PROLAPSUS.

ANVIL, n. *ăn'vĭl* [AS. *anfilt;* Low Ger. *ambolt;* Dut. *aenbeld,* a block to hammer on]. an iron block with a smooth face and a horn, on which smiths shape their work. ON THE ANVIL, in a state of formation and preparation; not yet matured.

ANVILLE, *ŏn'vēl,* JEAN BAPTISTE BOURGUIGNON D': 1697–1782; b. Paris: celebrated French geographer. His first study of the ancient authors induced him to publish, at the age of 15, a map of Greece. His rare qualities gained the friendship of the Abbé de Songuerue, whose instructions were the source of his profound and extensive knowledge. He advanced the science of geography, both by his very numerous maps, and by his elaborate treatises. The principal portion of A.'s works, edited by M. de Maine, was published in 1834 by Levrault. But the death of M. de Maine, in 1832, stopped the quarto edition near the end of the twelfth volume. A. left 211 maps and plans, and 78 memoirs, the most of which are inserted in the *Recueil des Mémoires de l'Académie des Inscriptions et Belles-lettres.* His best map is that of Ancient Egypt. His *Orbis Veteribus Notus,* and *Orbis Romanus,* are of great value, as also his maps of Gaul, Italy, and Greece, both ancient and mediæval. His collection of maps was purchased in 1779 by the French government for the Royal Library.

ANWARI, *ăn'wŏ-rē,* lived 12th c.; d. 1200–01; b. in the prov. of Khorassan: celebrated Persian poet; educated at the college of Mansur, at Tus. He emerged from obscurity in the course of a night. The story goes that the Seljukide sultan, Sanjar, happened on one occasion to visit Tus, when the imagination of the youthful poet was so excited by the presence of the monarch and his glittering retinue, that he resolved to write a poem in his praise. By next morning it was finished, and presented to Sanjar, who instantly placed the fortunate youth among his courtiers. A. turned his attention to astrology, which was his ruin; for having predicted that in 1185 or 1186 a hurricane would burst over all Asia, overthrow the most solid edifices, and shake the very mountains, and nothing of the sort really occurring, but, on the contrary, an entire year of remarkably tranquil weather, he fell into disgrace, and retired to Balkh, where he died. His poems consist chiefly of long panegyrics, and shorter lyrical effusions. The latter (*ghazels*) are characterized by simplicity, ease, and naturalness; but the *kasidas,* or long poems, are disfigured, like many other eastern poems, by glittering imagery and historical conceits. His *Elegy on the Captivity of Sanjar taken Prisoner by the Ghurides,* has been translated into English by Captain Kirkpatrick in the 1st vol. of *Asiatic Miscellanies* (Calcutta, 1785).

ANXIETY, n. *ăng-zī'ĕ-tĭ* [F. *anxiété,* anxiety—from L. *an'xĭĕtātem,* anxiety—from L. *anxĭus,* anxious; *ango,* I press tight (see ANGUISH)]: distress of mind about some-

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thing future; great uneasiness. ANXIOUS, a. *ănk'shŭs*, literally, that chokes or strangles; distressed in mind; perplexed. ANX'IOUSLY, ad. *-lĭ*. ANX'IOUSNESS, n. the state of being anxious.—SYN. of 'anxious': restless; disturbed; uneasy; unquiet; concerned; watchful;—of 'anxiety': care; solicitude; concern; uneasiness; foreboding; disquiet; disquietude; perplexity.

ANY, a. *ĕn'nĭ* [AS. *aenig;* Ger. *einig;* Dut. *eenig*, one, only, and postfix *ig*]: every; whoever; one or some; one of many: in *Bible*, at all. ANYWISE, ad. *ĕn'nĭ-wīz*, in any degree. AN'YWHERE, ad. *-hwār*, in any place. ANYHOW, ad. *ĕn'nĭ-how*, at any rate, in any event; in a careless, slovenly manner. ANYBODY, n. *ĕn'nĭ-bŏd'ĭ*, one out of many selected indifferently. ANYTHING, n. indifference by way of selection; not one thing more particularly than another; a particular object. ANY ONE, n. no one in particular; 'one,' when preceded by a negative. ANYWHILE, ad. for any length of time.

AONIAN, a. *ā-ō'nĭ-ăn* [from *Aōnĭă*, a dist. in Greece, in which were Mt. Helicon and the fountain Aganippe; a haunt of the Muses]: pertaining to the Muses. AONIDES, n. *ā-ŏn'ĭ-dēz*, a name for the Muses.

AONLAGANJ', or AOUN'LAH: town of India, in the British dist. Bareilly, 21 m. s.w. of Bareilly, on the route to Allygurh. It has a large bazaar. Pop. (1871) 9,947.

AORIST, n. *ā'ŏ-rĭst* [Gr. *āŏris'tos*, unlimited]: a past tense in the grammar of the Greek language; a form of the Greek word by which an action is expressed as taking place in an indefinite time. The Greek language is especially fertile in the past tenses of verbs, having, in addition to the tenses common to other languages—the imperfect, perfect, and pluperfect—the A., which is peculiarly adapted to the narrative style of writing. The distinction of first and second A. is merely formal. AORISTIC, a. *ā'ŏ-rĭs'tĭk*, pert. to.

AORTA, n. *ā-ŏr'tă* [Gr. *ā'ŏrtē*, the great artery—from *aei'rō*, I bear or carry]: the great arterial trunk which, rising from the left ventricle of the heart, sends its branches ramifying through the whole body. AORTAL, a. *ā-ŏr'tăl*, or AORTIC, a. *ā-ŏr'tĭk*, pert. to. The A. in man is subdivided by anatomists into the Arch, the Thoracic A., and the Abdominal A. The *arch* is a loop with the convexity directed upwards, forwards, and to the right side, reaching at its highest part to a level with the second piece of the breast-bone, and then descending to the left side of the third dorsal vertebra. Five arteries arise from the arch—viz., two coronaries, for the supply of the muscular tissue of the heart itself; the innominata; and the left carotid and left subclavian arteries. At the commencement of the arch are three small swellings or pouches, the aortic sinuses, below which are the three semilunar valves or folds of the lining membrane, which prevent regurgitation of the blood back into the heart. The *thoracic* A. extends from the third dorsal vertebra to the diaphragm, gradually

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getting into the middle line of the spine. The thoracic A. gives off the bronchial arteries (two or three) to supply the tissue of the lungs; and some small branches (three or four) to the œsophagus, and intercostal arteries, to supply the walls of the chest (ten on left, and nine on right side). The *abdominal A.* passes from the diaphragm to the fourth lumbar vertebra, opposite the lower margin of which it divides into the two common iliac trunks. The abdominal A. gives off the two phrenic arteries to the diaphragm; the cœliac axis, which divides into three large branches for the stomach, liver, and spleen; the superior mesenteric for the small, and part of the large intestine; the *renals* (two); the *supra*-renals (two), one for each kidney; the spermatic; the inferior mesenteric, for the part of the large intestine not supplied by the superior mesenteric; and four or five lumbar arteries, which supply the lower part of the abdominal walls (the loins).

Aorta:
a, ascending arch of aorta; *ss*, coronary arteries; *b'*, innominata artery; *b*, right subclavian; *c*, right carotid; *d*, left carotid; *e*, left subclavian; *f*, thoracic aorta; *gg*, diaphragm; *hh*, phrenic arteries; *i*, cœliac axis; *k*, coronary or gastric; *l*, splenic; *m*, hepatic; *n*, superior mesenteric; *oo*, renal arteries; *p*, inferior mesenteric; *p'*, spermatic; *q*, common iliac; *r*, middle sacral.

Where the A. bifurcates, a small artery, the *sacramedia*, or *caudal* artery, arises, and passes along in the middle line; in fish and in animals with large tails, this branch is a continuation of the A.

The above is the usual arrangement; but occasionally it varies, especially in the number of arteries springing from the arch. For the structure of the A. see ARTERY; for the comparative anatomy, see HEART: CIRCULATION.

AOSTA. *â-ôs'tâ:* dist. of the prov. of Turin, n. Italy, surrounded by the highest elevations of the Alps, and watered by the river Dora baltea; area, over 1,200 sq. miles. The dense pine-woods on the hills, the alpine pastures on the slopes, the plantations of vines, almonds, olives, figs, and mulberry trees in the valleys, and the ores of silver, copper, and iron in the bosom of the mountains, supply occupation and means of subsistence; but the land generally is not adapted to the growth of corn, though maize, barley, oats, etc., are produced in the lowest portions of the valleys. The disease styled Cretinism (q.v.) prevails to a lamentable extent,

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and few persons are altogether free from Goitre (q.v.). Great numbers of the poorer class emigrate during winter into the richer countries in their vicinity, and earn a livelihood as chimney-sweepers, masons, and smiths. Pop: abt. 83,000.

AOSTA, the principal town, 49 m. n.n.w. of Turin, has trade in cheese, hemp, leather, etc. It was in ancient times the chief residence of the Salassi, a brave race of mountaineers, with whom Appius Claudius had to contend on his way into Gaul. They were finally destroyed by Terentius Varro in the time of Augustus. Monuments of the Roman times remain—a well-preserved arch, two gateways, the ruins of an amphitheatre, and a bridge. The celebrated baths and mines of St. Didier are in the neighborhood. St. Bernard, the founder of the famous hospice which bears his name, was Archdeacon of A.; and Anselm, Abp. of Canterbury, was born here. Pop. (1894) 7,437.

AOUDAD, n. *ā'ō-dăd* [native name]: a ferocious species of wild sheep inhabiting n. Africa.

APACE, ad. *ă-pās'* [AS. *a*, on: F. *pas;* L. *passus*, a step]: with some degree of speed; in haste; quickly; by-and-by.

APACHES, *ā-pā'chāz:* tribe of American Indians of the Athabasca family, having reservations in Ariz. and N. M. They are very warlike, great raiders, and strongly averse to civilized forms of life. The tribe comprises several semi-independent bands, and their great war chief is Geronimo. They have given the frontier settlers of Mexico, Ariz., and N. M., and the federal govt. much trouble in recent years. Geronimo became known 1876, and has been captured several times by U. S. troops, but almost invariably has made his escape. He is considered by experienced army officers to be the most tricky, lawless, deceitful, treacherous, and murderous of living Indians. Gen. Crook chased his renegade band into Mexico 1883, and captured the chief and his followers. They were placed on a farm, and though Gen. Crook promised them protection as long as they behaved themselves, they soon tired of the restraint. Geronimo escaped from Fort Apache 1885, May 17—his third escape—was captured by Gen. Miles 1886, and has since been confined in Fla.

APAFI, *ŏp'pŏf-ē*, MICHAEL I., Prince of Transylvania: 1632–1690, Apr. 15. He belonged to an old family; accompanied Prince George II. in an expedition against the Poles 1656; was taken prisoner; and after his release lived at his paternal estate till 1661, when he was chosen prince of Transylvania. He reigned under the protection of Turkey till the siege of Vienna 1683, when the Austrian troops entered his territory, and 1687, Aug. 12, he made a treaty with the emperor by which Transylvania was placed under German protection. His death occurred on the eve of a fierce war begun by the Turks. His son, MICHAEL II., succeeded to the throne. The Turks defeated the imperial army, and captured several cities; but the imperial troops regained everything, and A. was induced to surrender his territory to Austria for a pension. Michael II. died 1713.

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APAGOGE, n. *ăp'ă-gō'jē* [Gr. *apagōgē*, a leading away —from *apo*, from; *ago*, I lead]: in *logic*, a kind of argument or proposition not very evident; in *math.*, the step leading from one proposition to another, when the first, after demonstration, is employed in proving the second or others. **Apagogical**, a. *ăp'ă-gŏj'ĭ-kăl*, proving indirectly.

APANAGE: see **Appanage**.

APART, ad. *ă-pärt'* [F. *à part*, aside, separate; L. *partem*, a part]: aside; separately; at a distance. **Apart'ment**, n. [OF. *apartement*; F. *appartement*—from mid. L. *appartimen'tum*]: something set aside; a room in a house. **Apart'ments**, a set of rooms. See **Tenement Houses**.

APATHIN, *ŏ-pŏ-tēn'*: town of Hungary, county of Bacs, near the left bank of the Danube; 49 m. s.w. from Theresiopol. It has manufactures of woolen cloth, and considerable trade in hemp, silk, madder, and woad, the products of the vicinity. Pop. (1894) 11,047.

APATHY, n. *ăp'ă-thĭ* [F. *apathie*, apathy: L. *apăthia*; Gr. *apatheĭ'a*, exemption from passion—from Gr. *a*, without; *păthos*, any emotion of the mind]: not any feeling; freedom from passion or feeling. **Ap'athist**, n. one destitute of feeling. **Apathetic**, a. *ăp'ă-thĕt'ĭk*, or **Ap'athet'ical**, a. *-ĭ-kăl*, wanting in feeling; insensible. **Ap'athet'ically**, ad. *-lĭ*.—**Syn.** of 'apathy': indifference; insensibility; unfeelingness; supineness; carelessness; unconcern.

APATITE, n. *ăp'ă-tīt* [Gr. *apătē*, deception, from liability of this mineral to be mistaken for other substances]: a mineral consisting mainly of phosphate of lime (bone-earth), and which for some years past has been largely used in the preparation of manures. It is employed for the same purpose as bones or bone-ash—namely, to supply phosphoric acid to the soil. The massive radiated variety is sometimes called *phosphorite*, and when massive, earthy, and impure, it is also known as *osteolite*. Coprolites (q.v.), or phosphatic nodules, are likewise mainly composed of phosphate of lime. A. is found as a bedded rock, in compact spheroidal masses, in veins and dykes, and as an accessory constituent of rocks. It exists in nearly all geological formations, but is perhaps most abundant in the older metamorphic rocks. Extensive deposits of A. occur in various parts of the world. From Kragerŏe in Norway, where it occurs associated with granitic rocks, and from Estremadura in Spain, where it is found in cretaceous strata, it has been largely sent to England, the total imports of these mineral phosphates having in some years reached 5,000 tons. There is a bed of A., 18 inches thick, of Silurian age, at Llanfyllin in North Wales, which has been extensively worked. A remarkable deposit of a kind of A., or rather rock guano, which has been termed 'Sombrerite,' was discovered some years ago in the small island of Sombrero, situated about 60 m. to the e. of St. Thomas, in the West Indian group. It covers a great part of the island, which is about 1½ m. long by three-fourths of a m. in breadth. Mr. A. A. Julien, writing from the spot in 1864, says there 'is a natural division of the Sombrero Guano into two varieties—

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one of an oolitic structure, of a great variety of colors, and containing, in addition to the bone ($3CaO,PO_5$) and neutral ($2CaO,PO_5$) phosphates of lime, the phosphates of alumina, iron, and magnesia, etc. The other variety, generally of a broad concretionary structure, is of a white or yellowish-white color, containing a little carbonate of lime, sulphate of lime, etc., but especially abounds in bone phosphate of lime. It is almost certain that the former more nearly resembles the original deposit, and is the older of the two; while the latter is far more uniform in composition. The guano is interlaminated with ordinary coral limestone. It is now believed that this hard or rock guano has been formed by water filtering through ordinary guano, into the coral rock adjoining, and turning it more or less completely into phosphate of lime. A similar hard guano occurs at Monk's Island, and one or two others in the Caribbean Sea. Large quantities have been introduced into the United States, under the name of Sombrero Guano, and are extensively employed by the manufacturers of artificial manures, in place of ordinary bone-ash. It is largely used in Britain also. The general treatment to which mineral phosphate is subjected, is to reduce it to powder, and act upon the pulverized matter with sulphuric acid, which renders the phosphoric acid in the A. soluble in water, and thereby facilitates its introduction into the plant. These substances require to be ground to a finer powder, and subjected to a more protracted digestion than bones. In the greater number of cases where the A. or Sombrero Guano is treated in this way, it is mixed with other manures, such as Peruvian Guano, blood, or true bones, and thus a complex substance is manufactured, which is much more acceptable to the plant than the simple A. or *mineral phosphate* itself. The great importance of mineral phosphate, in an agricultural point of view, arises from the fact that no mineral substance possesses more influence over the growth of the edible plants, such as wheat, barley, oats, turnips, etc., than phosphoric acid does; any cheap source of that substance, therefore, is a great boon. The island of Sombrero contains as much phosphatic or bony matter as is present in many millions of oxen, and represents as much manure as would be obtained by the employment of the bones of these cattle. It was first proposed to use A. as manure abt. 1856. The different varieties of A. contain a little fluoride or chloride of calcium, or both, as well as phosphate of lime. Of these varieties, besides those already mentioned, there are others, as *Moroxite*, *Francolite*, and *Asparagus Stone*. It occurs both massive and in crystals—which are generally small, and are often six-sided prisms, or six-sided tables, but some very large ones have been brought from Canada. It occurs in some of the tin mines in Cornwall, Saxony, Bohemia, etc., and in rocks of various ages, as mentioned above. It is of various colors, more or less green, blue or red, sometimes white and often gray. In Spain, A. is used as a building stone.

APE, n. *āp* [AS. *apa:* Icel. *api:* Dan. *abe*]: a kind of monkey; a vain imitator; a mimic: V. foolishly to try to

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imitate. AP'ING, imp. APED, pp. *āpt.* AP'ER, n. one who. APISH, a. *āp'ĭsh,* like an ape; foolish; imitating the manners of superiors. AP'ISHLY, ad. *-lĭ.* AP'ISHNESS, n. foppery.—SYN. of 'ape, v.': to mimic; imitate; mock.

APE: name commonly given to the tailless monkeys. See BARBARY APE: CHIMPANZEE: GIBBON: GORILLA: ORANG-OTANG, etc. It was originally commensurate in signification with monkey, and the terms were indiscriminately used. The origin of the word is uncertain. See MONKEY.

The worship of apes or monkeys has been common among pagan nations from remote antiquity, and still prevails extensively, being practiced in Japan, in India, and by some of the African tribes. The source of it is, perhaps, to be found partly in the doctrine of the transmigration of souls, and partly in the qualities which apes have been supposed to possess in a conspicuous degree, and of which they have been made symbolic. An A.'s tooth, kept in a temple in Ceylon, was regarded with extraordinary veneration, and immense wealth was accumulated through the continual offerings of the worshippers; but the temple was plundered, and the tooth carried away by the Portuguese in 1554.

APEAK, or APEEK, ad. *ă·pēk'* [*a* and *peak:* F. *à pic,* perpendicularly—from *pic,* a peak, a point]: on the peak or point; in a posture to pierce; a maritime term signifying the position of an anchor when the cable has been drawn so tight as to bring the ship directly over it; the sailors then say that 'the anchor is apeak.'

APELDORN, *ā'pĕl-dōrn':* a beautiful village in the Netherlands, province of Gelderland, about 17 m. n. from Arnhem, on a canal which joins the river Grift, a branch of the Yssel, by which, and the public roads from Arnhem and Utrecht to Deventer and Zutphen, and by railway, it has much traffic. The Loo, a hunting-lodge of the king, is in the neighborhood. The principal industries are agriculture, making paper, grinding corn, founding copper, manufacturing blankets and coarse woolen cloth, etc. Pop. of A. (1894) 16,283.

APELLES, *a-pĕl'ēz:* the most celebrated painter in ancient times: lived in latter part of B.C. 4th c., prob. abt. B.C. 352–308; son of Pythieas, b. probably (according to Suidas), at Colophon, on the Ionian coast of Asia Minor; though Pliny and Ovid call him a Coan, and Strabo, and Lucian an Ephesian. This, however, may simply refer to the fact that he was made a burgess of that town. He received his first instruction in art in the Ionian school of Ephesus, then studied under Pamphilus of Amphipolis, and latterly at Sicyon, under Melanthius; and thus he united the fine coloring of the Ionian with the accurate drawing of the Sicyonic school. During the time of Philip, A. visited Macedon, where he became the intimate friend of Alexander the Great. It was probably at the Macedonian court that the best days of A. were spent. Pliny relates that on one occasion when Alexander visited A. in his studio, the king exhibited such ignorance of art, that A. recommended him to be silent, as the boys who were grinding the colors were laughing

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at him. But the same story is told of Zeuxis and Megabyzus. He afterwards visited Rhodes (where he was familiar with Protogenes), Cos, Alexandria, and Ephesus. The period of his death is not known; but as he practiced his art before the death of Philip, and as his visit to Alexandria was after the assumption of the regal title by Ptolemy, he lived, probably, between the dates above stated. The most celebrated paintings of A. were his *Anadyomene*, or *Venus Rising from the Sea*, with a shower of silver drops falling round her like a veil of gauze; the Graces, and similar subjects; but he cultivated the heroic as well as the graceful style. His ideal portrait of Alexander wielding a thunderbolt was highly esteemed, and preserved in the temple of Diana at Ephesus. With reference to this painting, Alexander said: 'There are only two Alexanders—the invincible son of Philip, and the inimitable Alexander of A.' A. is said to have left an incomplete painting of Venus, to which no other painter would presume to give the finishing touches. The disposition of A. was remarkably free from envy, and he willingly acknowledged the merits of his contemporaries. Amphion, he said, excelled him in grouping, and Asclepiodorus in perspective, but *grace* was his alone. On coming to Rhodes, and finding that the works of Protogenes were not appreciated by his countrymen, he at once offered him fifty talents for a picture, and spread the report that he intended to sell it again as his own. The industry with which he practiced drawing was so great as to give rise to the proverb, *Nulla dies sine lineâ.* Many other anecdotes are related of A. When his pictures were exposed to public view, he used to place himself behind a picture, to listen to the criticisms of the common people. A cobbler having detected a fault in the shoe of one of his figures, it is said that A. instantly rectified it; but when the cobbler, on the following day, extended his criticism to the legs, the painter rushed from his hiding-place, and told the cobbler to stick to the shoes; or, in the Latin version, which has become proverbial, *Ne sutor supra crepidam.*

APENNINES, n. *ăp'ĕ-nīnz* [Ital. *Appenni'ni;* anciently, Lat. *Mons Apenninus*]: a mountain-chain extending uninterruptedly through the whole length of the Italian peninsula, between 37° and 44° 30′ n. lat., and 7° 40′ and 18° 20′ e. long.; belonging to the system of the Alps, from which it branches off at the Col de Tenda, near the sources of the Tanaro. From this point, the chain, under the name of the Ligurian A., girdles the Gulf of Genoa, in the immediate vicinity of the sea, and then runs inland to a considerable extent, forming the water-shed between the Adriatic and the Mediterranean, but gradually approaching the e. coast, till, in the highlands of the Abruzzi, it is close upon it; after which it takes a s.w. direction through Naples, dips under the sea at the Strait of Messina, and reappears on the n. coast of Sicily. Recent geographers divide the A. as follows: 1. *The North A.*, from the Col de Tenda in the Maritime Alps to the pass of Borgo San Sepolcro, in the neighborhood of Arezzo, on the e. border of Tuscany. 2. *The Central A.*, from

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Arezzo to the valley of the Pescara, which flows between the two Abruzzi. 3. *The South A.*, from the valley of the Pescara to Cape Spartivento. 4. *The Insular A.*, or the Sicilian range. The leading feature of the A., wherever they approach the coast, is their extraordinarily steep declivities; while in Middle Italy and the adjoining portions of Upper and Lower Italy, long-terraced plateaus, lower ranges, and, finally, extensive coast-plains, mark their gradual descent on the w. The general name for these lower ranges is *Sub-Apennine;* but they have a variety of particular designations, such as, the mountains of Carrara and Seravezza, Pratomagno and Monte Amiata, in Tuscany; the Sabine, Alban, and Volscian mountains, in the former papal states; Monte Gargano on the s.e. coast, n. of Manfredonia, etc. The main chain of the A. does not send off spurs into the Apulian peninsula, or heel of Italy, which, for the most part, is rather level, or only interspersed with detached groups of hills.

The direction of the great chain of the A. is favorable to the formation, on the w. side, of important river-basins, such as those of the Arno, the Tiber, the Garigliano, and the Volturno; while on the e. side we find nothing but small streams, in most cases destitute of affluents, hurrying down to the sea through wild, precipitous valleys. In n. Italy, the Ligurian A., almost overhanging the Gulf of Genoa, can only develop on the s. puny streams, while the n. sends down, through the plains of Piedmont, large tributaries to the Po.

The average height of the entire chain of the A. is about 4,000 ft., which, however, in the n. sinks down to little more than 3,500 ft.; and in the mountains of the Abruzzi rises to 7,000 feet. Here, in Monte Corno, the highest peak of the range known under the name of Gran Sasso d'Italia, they reach an elevation of 10,200 ft., and in Monte Velino, of 7,850 feet. The North A. attain, in Monte Cimone, situated in the s. of Modena, a height of 6,973 ft.; the South A., in Monte Amara, a height of 9,000 ft.; the Insular A., if we exclude the isolated peak of Ætna—in Pizzo di Case, a height of 6,500 feet.

The A. are crossed by thirteen principal passes: these are, proceeding from n. to s.: 1. The Pass of Savona; 2, of Bocchetta; 3, of Cisa; 4, of Monte Cimone; 5, of Porretta; 6, of Pietramala; 7, of Borgo San Sepolcro; 8, of Furlo; 9, of Serravalle; 10, of Aquila; 11, of Isernia; 12, of Arcano and Troja; 13, of Potenza. The prevalent stone is a species of compact limestone, of a whitish-gray color, belonging to the Jura formation. Resting on the limestone is a more recent formation of sandstone and marl, especially abundant in the middle region of the Sub-A., containing an extraordinary number of petrifactions, and reckoned as belonging to the upper division of the Parisian limestone. Older formations, however, frequently crop out. Thus, on the water-shed of the North and Central A. there are found transition clay-slate, grauwacke-slate, etc. The A., especially the Roman and Neapolitan, are distinguished from all other mountain-chains by the rich variety of marbles

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which they contain. In some places the quarries seem inexhaustible. Volcanic rocks are numerous in the middle and s. regions, where the agency of fire has caused very wonderful formations, as, for instance, the crater-lakes of Albano, Nemi, Vesuvius, Solfatara.

The principal chain exhibits, for the most part, a dreary and barren appearance; it looks like a vast wall, with very few projecting peaks to break the dull monotony of the scene, and therefore seldom furnishes any salient points on which the eye of the spectator can rest with pleasure. Naked, riven, covered with thick *débris*, the declivities seem as if scorched by the southern sun. Only in the Abruzzi, in the Sub-A., and above all, in the marble mountains of Carrara and Seravezza, do the bold and magnificent forms of the Alps reappear. Where the A.—in general so poorly supplied with streams—exhibit a trace of Alpine abundance of water, there is no lack of rich pastures and dense forests, but usually only thin grass and wild scrubby bushes cover the stony slopes. The greater number of the roaring forest brooks, in the deep rocky ravines, disappear during summer, leaving a dry bed. Where the mountains dip down to the sea, as at the Riviera of Genoa and the Gulf of Naples, a rich, peculiarly southern vegetation clothes the declivities. Gigantic agaves, Indian figs (*Cactus Opuntia*), myrtle-bushes, orange-groves, hint in these northern lands of the splendors of the tropics. Up to 3,000 ft. of elevation, cornfields, fruit-bearing chestnuts, and deciduous oaks are found. Beyond this, all vegetation often ceases on the steep and stony sides of the mountains; but at other times the beech or the fir appears in dense forests. There is no region of perpetual snow; but the summits of the Abruzzi and the lofty peaks of Lunigiana are often covered with snow from October far into May, and send their icy breath so suddenly down into the mild valleys that the temperature in a few hours sinks 12°–18° F., and a warm spring afternoon is succeeded by a cold December evening. APENNINE, a. pertaining to the Apennines.

APENRADE, *ä'pén-rä'dē:* town in the Prussian prov. of Schleswig-Holstein; at the bottom of a gulf in the Little Belt; with an excellent harbor and considerable shipping. The environs of the town are beautiful. The first historical mention made of A. relates to its destruction by the Slaves in 1148; and, indeed, its position has always laid it open to the casualties of northern war, whether on a large or small scale, as has been especially seen since 1848. Near the town stands the castle of Brundlund, built by Queen Margaret in 1411, in which the bailiff of the place resides. Pop. (1894) 5,933.

APERIENT, n. *ă-pēr'ĭ-ĕnt* [L. *aperien'tem*, opening]: a medicine that opens the bowels; a laxative: ADJ. opening; gently purgative. APERITIVE, a *ă-pēr'ĭ-tĭv*, purgative.

APERTURE, n. *ăp'ēr-tūr* [L. *apĕrtūrā*, an opening—from *aperĭō*, I uncover]: an opening; a cleft or gap.

APETALOUS, a. *ă-pĕt'ă-lŭs* [Gr. *a*, without; *pĕtalon*, a

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flower-leaf]: in *bot.*, having no petals or flower-leaves. APET'ALOUS'NESS, n.

APETALOUS: a term in Botany, applied to flowers or to flowering plants, and signifying that they are destitute of petals or corolla (q.v.). When both the calyx and corolla are wanting, the flower is said to be *achlamydeous* (from the Greek *chlamys*, a covering), or naked. The absence of the whorl of petals sometimes occurs in an exceptional manner in orders or genera ordinarily characterized by its presence. In some plants, as in certain species of the order *Caryophyllaceæ*, petals are sometimes present, sometimes absent, a tendency apparently existing to the suppression of this whorl.

APEX, n. *ā'pĕks*, APEXES, n. plu. *ā'pĕks·ĕs*, or APICES, n. plu. *ăp'ĭ·sēz* [L. *apex* or *ăpĭcem*, a point]: the top point or summit of anything. APICAL, a. *ăp'ĭ·kăl*, relating to the top. APICULUS, n. *ă·pĭk'ū·lŭs* [dim. of *apex*]: in *bot.*, a short but sharp point in which a leaf or other organ terminates, but not very stiff. APICULATE, a. *ă·pĭk'ū·lāt*, suddenly terminated by a distinct point.

APHÆRESIS or APHERESIS, n. *ăf'rĕ·sĭs* [Gr. *aphairĕsis*, a taking away, abstraction—from *apo*, from; *hairĕō*, I take or seize]: the taking away a letter or syllable from the beginning of a word.

APHANIPTERA, n. *ăf'ăn·ĭp'tĕr·ă* [Gr. *aph'anēs*, unseen, not apparent—from *a*, not; *phaino*, I show; *pteron*, wing]: old order of insects, comprising fleas, apparently without wings. APH'ANIP'TEROUS, a. *-ŭs*, pert. to.—Fleas are now classified in the order *Diptera*.

APHANITE, n. *ăf'ăn·īt* [Gr. *apha'nēs*, obscure, not apparent—from *a*, not; *phaino*, I bring to light]: a compact sort of trap-rock, consisting of hornblende, quartz, and felspar so intimately combined that they cannot be individually distinguished. APHANISTIC, a. *ăf'ăn·ĭs'tĭk*, pertaining to; indistinct.

APHASIA, n. *ă·fā'zhĭ·ă* [Gr. *apha'sĭă*, inability to speak from amazement or fear—from *a*, not; *phăō*, I speak]: in *med.*, loss of the cerebral faculty of speech; loss of the memory of words: term adopted by the eminent French physician, Trousseau, to denote a remarkable symptom of certain conditions of the nervous system in which the patient is more or less unable to express his thoughts in speech. The disease has been casually noticed by many earlier observers, among whom was Dr. Parry, of Bath, Eng.; but not until the last twenty years has it received the attention which its great singularity demands. Before receiving its present name, it had been termed *Aphemia* (from *a*, not, and *phemi*, I speak), and *Alalia* (from *laleo*, I talk). Voisin, in an elaborate Memoir on this subject, 1865, observes that it may be due to several causes. It may be congenital or acquired, and in the latter case is due to some form of lesion or injury of the anterior lobes of the brain. This fact was observed as long ago as 1825 by Bouillaud; but in 1861, during a discussion of the Anthropological Soc. of Paris on

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to whether certain faculties, such as language, are or are not localized in special parts of the brain, Broca advanced the view that the faculty of language has its seat not only in the anterior lobes, but in the left lobe, and occupies exactly the external left frontal convolution, where the anterior lobe meets the middle lobe immediately in front of the fissure of Sylvius. This singular conclusion was deduced from only two post-mortem examinations which had just occurred at the Bicêtre, but a number of previously published cases supported it; and Dr. Hughlings Jackson, of the London Hospital, 'has seen about 70 cases of loss or defect of speech with hemiplegia, and in all but one the hemiplegia was on the right side, indicating disease of the *left* side of the brain.' —*Lancet*, 1864, Nov. 26. Moreover, in the two cases which during the year last named proved fatal in the Edinburgh and Glasgow infirmaries, Dr. Sanders and Dr. Gairdner traced the disease to the *exact spot* described by Broca. It may be caused by wounds, tumors of various kinds, including hydatids, or by softening of the left anterior lobe, and has occasionally, but very rarely, been found in association with lesions of other parts of the cerebrum, and even of the cerebellum and spinal cord. According to Voisin, in 146 cases, the left anterior lobe was affected in 140, and the right in only 6 cases. A variety of A. has been noticed in typhoid fever and in the first stage of small-pox; also in certain chronic cachexias or intoxications, as, for example, in syphilis and chronic alcoholism; and there are cases in which the affection is purely nervous, and results from epilepsy, an over-taxed brain, etc. The patients in whom true A. from disease of the brain occurs are excellently described by Dr. Gairdner in his essay *On the Functions of Articulate Speech*, etc. (Glasgow, 1866). This description, in a condensed form, is as follows: These patients have been the subject of some form of disturbance of the cerebral functions, sometimes with, but sometimes without, a manifest disturbance of the intellect. It may have been epilepsy or apoplexy, in which latter case, as has been already noticed, there is often paralysis, almost invariably on the right side of the body. This paralysis may be of any extent of completeness, but in many cases the patient has such command over the movements of the tongue and lips as to show that it is not from paralysis his speech is affected. The states of intellect and consciousness are equally variable, the patient occasionally appearing and behaving as if he were in perfect bodily and mental health, except for the A. Moreover, the A. shows itself in most varied forms. In the more trivial cases it is little more than an aggravation of the common defect of forgetting, or being unable to recall the name of a person or thing when wanted. Dr. Gairdner records the case of what he calls 'an aphasic,' who could conduct an ordinary conversation pretty well, but who could not name the days of the week, and would, for instance, call Monday 'the first working-day,' and who had forgotten, or could not give utterance to his own name. Sometimes a patient will perfectly articulate such expressions as these: 'I want ——, I want ——, Where's the ——,' almost always

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stopping short at the name of the object. Sometimes the patient's vocabulary is limited to one or two common words, as 'Yes' or 'No'; or perhaps he utters only one or more unintelligible words, as in the case of one of Trousseau's patients, who for four months uttered nothing but '*Cousiss*' to every possible question, unless when in moments of great irritation, and he would then articulate '*Sacon, sacon*'—probably an abbreviation for a French oath. Strange to say, certain aphasics who can articulate absolutely nothing else, can swear with perfect facility. Such exclamations as 'Oh!' 'Dear me!' 'God bless my life!' and 'D—n it!' are often the only utterances of these patients. Dr. H. Jackson, in a Memoir on Aphasia, in the first volume of the *London Hospital Reports*, has made some excellent remarks on this peculiarity, which are well worthy of perusal by all who study mental philosophy. He ingeniously regards an oath not as a part of language, but as 'a sort of detonating comma.' The general reader may also read with advantage the histories of two cases recorded by Trousseau, in which Frenchmen of high mental capacity, and well acquainted with the disease (one of them an eminent physician in Paris, who had specially studied the diseases of the brain; and the other, Prof. Lordat, of Montpellier), have passed through attacks of A., have recovered, and have described their own cases.

A. may be either temporary or persistent; in the former case being due to loss of nervous energy, congestion, or some other functional disorder; while in the latter case it is probably associated with disease of structure. It is unnecessary to describe the treatment, which varies according to the peculiarity of each individual case, and must be left to the physician.

APHELION, n. *ă-fēl'yŭn*, APHELIA, n. plu. *ă fē'lĭ-ă* [Gr. *apo*, from; *hēliŏs*, the sun]: that point in the elliptical orbit of the planet which is most remote from the sun. The opposite point, or that nearest to the sun, is the PERIHELION. At the former point, the swiftness of the planet's motion is least, and begins to increase; at the latter, it is greatest, and begins to decrease. This irregularity of motion is most remarkable in comets whose orbits deviate most from the circle. The motion of the comet of 1680, at its perihelion, was calculated as 137,000 times more rapid than its motion in A. See APSIDES.

APHIS, n. *ā'fĭs*, APHIDES. n. plu. *ăf ĭ dēz* [L.]: genus of insects belonging to the order Hemiptera, sub-order Homoptera—type of a family called *Aphididæ*. They are small insects, often called plant-lice, which suck the juices of plants or trees which they thus injure and sometimes destroy. Different species, of which there are several hundred, prey on different portions of the plant or tree; but no part, from the root to the leaf, is exempt from their attacks. The woolly A. (*Schizoneura lanigera*), often destructive to young apple trees, appears in two forms, one of which preys on the roots and the other on the trunks and branches. It secretes a woolly substance which tends

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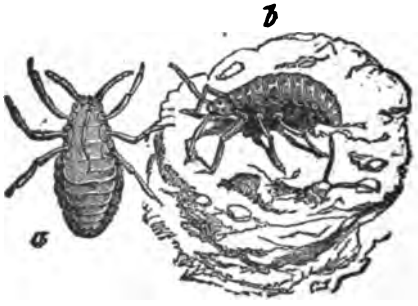
to protect it from dampness in the soil and from enemies above ground. The *A. mali* attacks the leaves and young twigs of the apple. Other species prey on the cherry, peach, and other fruit trees, and on the willow, white pine, and other ornamental and timber trees. A species which preys on the plum migrates to the hop plant and often does great damage (see HOP FLY). The *Anthomyia brassicæ* is exceedingly destructive to the cabbage and turnip, and nearly all field, garden, and greenhouse plants are subject to injury by some species of A. The principal remedies are for the root A., either kainit or refuse tobacco powder mixed through the soil by digging; and for those which work above ground, the use of kerosene emulsion (see EMULSION) or of a decoction of tobacco.



Apple Aphis (*Eriosoma Mali*):
a, wingless insect, magnified; *b*, wingless insect in excrescence of the tree, magnified.

Apple Aphis:
a branch with excrescences, reduced.

Whatever tends to keep the plants and trees in vigorous condition will tend also to prevent attacks by the A., and will lessen the degree of injury if an attack is made. It is very common to see the leaves of trees and shrubs deformed by red convexities. In the hollows of the under side of these, aphides live and find their food; the exhausted leaf at last curls up. They have a proboscis (*haustellum*), by which they pierce

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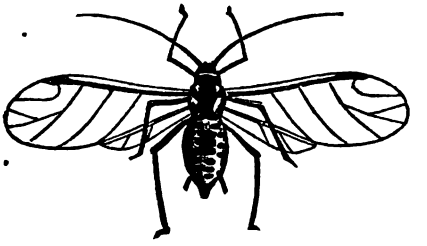
and suck plants; and at the extremity of the abdomen, two horn-like processes, from which exude frequent small drops of a saccharine fluid called *Honey-dew*, a favorite food of ants. It has been seen even to fall in a kind of shower from trees much covered with aphides. For the means which ants take to obtain this food, see ANT. The legs of aphides are long, and they move slowly and awkwardly by them. The greater number of them never have wings; it is in the



Potato Aphis (*Aphis vastator*): magnified fifty times.

autumn that perfect winged insects generally appear. From the pairing of these result eggs, which produce female aphides in the following spring, and successive generations of wingless aphides are produced in a viviparous manner without impregnation throughout the summer, after which winged aphides again appear. Their increase is restrained not only by birds, but by insects which feed on them. A family of coleopterous insects, to which the genus *Coccinella* or Lady-bird (q.v.) belongs, has received upon this account the name of *Aphidiphagi*, or aphis-eaters. There are also certain minute hymenopterous insects, which destroy them in great numbers by depositing their eggs in them; the larva feeds upon the living A., out of which it at last eats its way, leaving a mere desiccated skin.

APHLOGISTIC, a. *ăf'lō-jĭs'tĭk* [Gr. *a*, without; *phlogi'zo*, I burn up]: flameless.

APHONIA, n. *ă-fō'nĭ-ă*, or APHONY, *ăf'ō-nĭ* [Gr. *a*, without; *phōnē*, voice]: a loss of voice: distinct from mutism, in which it is impossible to form articulate sounds, and in most cases the voice is not entirely gone, but only more or less suppressed. The voice is essentially produced (see VOICE) by three distinct agents—viz., (1) the expiration of air, (2) the opening of the glottis, and (3) the tension of the vocal cords; hence anything interfering with expiration, or with the functions of the glottis and vocal cords, may cause aphonia. Thus, it may result from paralysis of the respiratory muscles, from pulmonary emphysema, and sometimes from pneumonia; or it may be caused by diseases of the larynx, as chronic laryngitis, œdema of the glottis, polypus, etc.; or by pressure on the larynx caused by abscesses, vegetations, and any kind of morbid growth; or it may be traced to some functional or organic disturbance of the inferior vocal cords. Thus, the muscular fibres which

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act on these cords may become affected in acute laryngitis by extension of the inflammation, or their action may be impeded by the pressure of false membrane in croup. In typhoid fever, the A. so commonly observed is due to ulceration extending to these structures. Again, in cases of lead or phosphorus poisoning, there is A. due to fatty degeneration of these muscles. Not unfrequently, A. may be traced to compression of the recurrent or inferior laryngeal nerve, which is the nerve supplying motor power to all the muscles of the larynx, with one trifling exception.

Such pressure is not unfrequently caused by an aneurism, an abscess, tumor, etc. In the same way, a wound or contusion of the pneumogastric nerve, or one of the recurrent branches, will cause A., or, more commonly, an extremely hoarse modification of the voice, in consequence of the laryngeal muscles being paralyzed on one side, and remaining active on the other. There are cases of direct nervous action being interfered with; but there are many cases of what may be termed *reflex A.*, as when the voice is often more or less lost in the course of pregnancy when accompanied with convulsions, or in consequence of the presence of intestinal worms, or after the rapid suppression of an exanthematous rash, or of a long-continued hemorrhagic discharge. Aphonia is, moreover, very commonly associated with hysteria.

When aphonia is not due to irremovable causes, as tumors pressing on the recurrent nerve, fatty degeneration of the laryngeal muscles, etc., it generally disappears after a longer or shorter interval. It occasionally assumes remarkable intermittent shapes. In one instance, the affection came on regularly at the same time of the year for seventeen years, beginning daily at noon, and lasting the remainder of the day, for a period varying from three to seven months. Another case is recorded in which, during fourteen years, a young woman could speak only during two or three hours daily.

In those cases which are amenable to treatment, emetics, electricity, strychnine, leeching, blistering, croton-oil liniment, and internal application of nitrate of silver, have been found the most useful remedies.

APHORISM, n. *ăf'ō-rĭzm* [Gr. *aphoris'mos*, a definition —*apo*, from; *hŏrĭzō*, I mark bounds or limits]: a phrase limited or terminated in its meaning; a short sentence expressing some important truth; a maxim, such as 'Habit is second nature.' The aphoristic style continued through extended writings, is at times impressive, but too long continued it grows wearisome. APHORISTIC, a. *ăf'ŏ-rĭs-tĭk*, or APH'ORIS'TICAL, a. *-tĭ-kăl*, expressing some truth in a short sentence. APH'ORIS'TICALLY, ad. *-lĭ*. APH'ORIST, n. *-rĭst*, one who.—SYN. of 'aphorism': proverb; apothegm; byword; axiom; maxim; saying; adage; saw; truism; principle.

APHRITE, n. *ăf'rīt* [Gr. *aphros*, froth or foam]: a scaly variety of calcareous spar, having a shining pearly lustre and a greasy feel.

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APHRODISIAC, a. *ăf'rō-dĭz'ĭ-ăk* [Gr. *aphrodis'ĭŏs*, pertaining to Venus]: that which excites to sexual intercourse.

APHRODITE, *ăf-rō-dī'tē:* the Greek name of Venus; according to various traditions, derived from *aphros* (foam), in allusion to the old poetical myth which represented the goddess as springing from the foam of the sea. See VENUS: APELLES. *Aphrodisia* were festivals celebrated in honor of A., in numerous cities of Greece, but especially in Cyprus. At Paphos, in this island, was her most ancient temple. Bloodless sacrifices alone were imagined to please A., such as flowers, incense, etc. Mysteries of an impure kind formed part of the ceremonial of the aphrodisia. Aphrodisia were no doubt held in the other places where A. was worshipped, such as Cythera, Sparta, Thebes, Elis, etc., though they are not mentioned. At Corinth and Athens, the Aphrodisia were celebrated principally by prostitutes.

APHTHÆ, n. *ăf-thē* [Gr. *aphthai*, ulcers in the mouth]: small white specks or sores on the tongue, gums, palate, etc.; the thrush; small vesicles formed of the superficial layer of a mucous membrane, elevated by fluid secreted by the latter. They are usually whitish in color, and the fluid may be serous or puriform. At the end of a few hours or days, the aphthous vesicle bursts at its summit, and shrivels up, exposing an inflamed and painful patch of the mucous membrane. The most common site of A. is the mucous membrane of the lips and mouth, but they occasionally appear wherever the mucous membrane approaches the skin. Infants are liable to an aphthous eruption termed *thrush* (q.v.). A. in adults are generally the consequences of fevers and other diseases, or a symptom of disturbance of the digestive system. In some cases of pulmonary consumption, they form a painful addition to the patient's sufferings. In ordinary cases of A., a preparation of borax, or some astringent wash, generally effects a rapid cure. APH'THOUS, a. *ăf'thŭs*, pertaining to thrush, or ulcerous affections of the mouth. APHTHOID, a. *ăf'thoyd* [Gr. *eidos*, resemblance]: resembling aphthæ.

APHTHONG, n. *ăf'thŏng* [Gr. *a*, without; *phthonggos*, a sound]: a silent letter or letters.

APHYLLOUS, a. *ăf-fĭl'lŭs* or *ăf'-* [Gr. *a*, without; *phullon*, a leaf]: in *bot.*, destitute of leaves; having leaves suppressed. APHYLLY, n. *ăf'ĭl-lĭ*, the suppression or want of leaves.

APIA, *ä'pē-ä:* principal town and commercial emporium of the Samoan or Navigator's Islands, in the s. Pacific Ocean, lat. 13° 30′—40° 30′ s., long. 169°—173° w. It is on the n. coast of Upolu, about midway between the e. and w. extremities of the island, which is divided into three parts, Ania at the e., Se Tuamasaga in the centre, and Aana at the w. end. A. also is divided into three parts or villages, which are separated by small streams. Vessels generally make the e. end of Upolu and run w., keeping the reef about one m. distant till off the harbor of A., where

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pilots are taken on board, and numberless little frail canoes containing natives cluster around. During Pres. Grant's administration, a kind of American protectorate over the islands was established, with Albert Barnes Steinberger in charge. This subsequently (1886) gave way to German occupation, though the United States and England had large commercial interests in the islands as well as Germany. After a series of native outbreaks and revolutions, the Germans deposed King Malietoa and exiled him to the Marshall Islands, and recognized Tamasese as his successor. The natives apparently preferred American to German protection and banded themselves under Malietoa's principal chief, Mataafa. Dissensions soon arose between the natives and the German consul, and later between the latter and American merchants; and these in time led to official acts by the German authorities against both the natives and American business representatives that were deemed unwarranted to the former and hostile to the latter. In 1888 a kind of civil war broke out, in which Germany claimed that the natives under Mataafa were encouraged and directed by an American citizen. The question of the govt. of Samoa then became one for diplomatic action. United States, England, and Germany agreed to a convention to be held in Berlin for the settlement of all questions in dispute and a new treaty was signed there by representatives of the three nations 1889, June 14. In the meantime the American men-of-war *Trenton*, *Vandalia*, and *Nipsic*, the English *Calliope*, and the German *Adler*, *Olga*, and *Eber* were sent to A. to protect the several national interests. On the afternoon 1889, Mar. 15, a hurricane suddenly broke over the harbor, and raged with fury till the next day. Though each vessel attempted to steam out to sea the *Calliope* alone succeeded in doing so. On the 16th the *Trenton* (flagship of Rear-admiral Kimberly), *Vandalia*, *Eber*, *Adler*, and *Olga* were wrecked on the reefs, and the *Nipsic* grounded and greatly injured. The loss of life was, Americans, 4 officers, 46 men; Germans, 9 officers, 87 men; total 146.

APIA'CEÆ: see UMBELLIFERÆ.

APIACERE: see AD LIBITUM.

APIARY, n. *ā'pĭ-ăr'ĭ*, A'PIAR'IES, n. plu. *-ăr'ĭz* [L. *apĭā'rĭum*, a bee-house—from *apis*, a bee]: a stand or shed for bees; a place where bees are kept. See BEE. A'PIAR'IST, n. one who rears bees. A'PIA'RIAN, a. *-ā'rĭ-ăn*, relating to bees. APICULTURE, n. *ā'pĭ-kŭl'tŭr* [L. *cultūra*, a cultivating]: rearing of bees for their honey and wax.

AP'ICAL, AP'ICES, APIC'ULATE, APIC'ULUS, etc.: see under APEX.

APICAL CELL: terminal cell of a growing shoot, or (beneath terminal cap) of a root, which, by continual subdivision, produces growth.

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APICIFIXED, a. *ă-pĭs'ĭ-fĭkst* [L. *apex* or *ăpĭcem*, a point: Eng. *fixed*]: in *bot.*, fixed apex to apex, as the apex of the filament attached to the apex of the anther.

APICIUS, *a-pĭsh'ĭ-us*, MARCUS GABIUS: a Roman epicure, in the times of Augustus and Tiberius; celebrated for his luxurious table and his acquirements in the art of cookery. When, by the gratification of his favorite indulgence, he had consumed the greater part of his fortune, and had only some $400,000 left, he poisoned himself, in order to avoid the misery of plain diet. Two other gourmands—one in the time of Pompey, the other in the reign of Trajan—are mentioned under the name Apicius. The Roman cookery-book, *Cœlii Apicii de Obsoniis et Condimentis sive de re Culinariâ* (libri decem), ascribed to A., belongs to a much later time, inasmuch as it abounds in inaccuracies and solecisms. Its author, *Cœlius*, has thought proper to recommend his work to gourmands by affixing to it the celebrated name of Apicius.

APIECE, ad. *ă-pēs'* [AS. *a*, to or on, and *piece*] to each, as a separate share.

APIOCRINITE, n. *ăp'ĭ-ŏk'rĭn-īt* [Gr. *a'pĭŏn*, a pear; *krinon*, a lily]: a fossil crinoid, abundant in the Bradford clay; the pear-encrinite.

APION, *a-pĭ-ŏn*, Greek grammarian: b. at Oasis, a town in Libya, but educated in Alexandria, which he affected to consider his birthplace, from a desire of being thought a pure Greek. He studied under Apollonius, the son of Archibius, from whom he acquired an admiration of Homer, and afterwards went to Rome, where he succeeded Theon as teacher of rhetoric. He was as remarkable for his loquacious vanity as for his knowledge. He declared that himself, and every one whom he mentioned, would be held in immortal memory; that he was equal to the first philosophers of Greece, and that Alexandria should be proud of him. From his bragging, Tiberius used to call him *Cymbalum Mundi* (the cymbal of the universe).

With the exception of one or two fragments, the whole of A.'s numerous writings are lost. He composed a work on the text of Homer, partly in the form of a dictionary, frequently referred to by subsequent authors; a work on Egypt, which contained the far-famed story of *Androclus and the Lion*, preserved by Aulus Gellius; a work against the Jews; one in praise of Alexander the Great; another on the great epicurean Apicius; histories of various countries, etc.

APIOS TUBEROSA, *ā'pĭ-ŏs tū-bĕr-ō'sa:* ground nut or wild bean (called *Glycine Apios* by Linnæus): plant belonging to the natural order *Leguminosæ*, sub-order *Papilionaceæ*, having tuberous roots, a twining stem, dark red flowers, leathery, two-valvular legumes, and pinnate leaves, with seven pair of smooth ovato-lanceolate leaflets. This plant, a native of N. Amer., has for a century been cultivated in botanic gardens in Europe, and has recently been brought into particular notice on the continent, largely through the French traveller Lamare-Picquot, who, during his travels in N. Amer., convinced himself of the value of the tubers as

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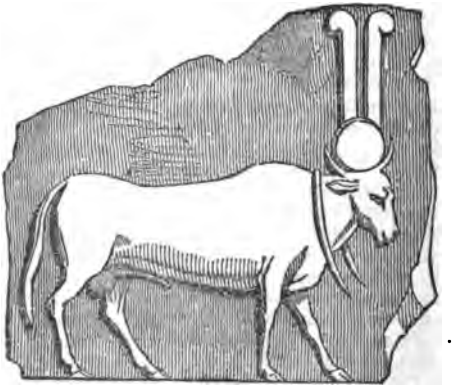
an article of food, for which they are there used to some extent. Various attempts have since been made to cultivate it like the potato; but its cultivation is found difficult, because of the length and weakness of the twining shoots, and the length of the roots. The tubers cooked in steam are free from all acridity and bitterness, and very much resemble potatoes dressed in the same way. They contain more nitrogen than potatoes (4·5 per cent.), also more starchy farina (33·55 according to an analysis by Payen).

APIS, n. *ā'pis* [L. and Gr. *Apis*]: the sacred bull, worshipped with divine honors by the ancient Egyptians, who regarded it as a symbol of Osiris, the god of the Nile, the husband of Isis, and the great divinity of Egypt. A sacred court or yard was set apart for the residence of A. in the temple of Ptah at Memphis, where a numerous retinue of priests waited upon him, and sacrifices of red oxen were offered to him. His movements, choice of places, and changes of appetite, were religiously regarded as oracles.



Apis.—Golden Calf.

It was an understood law that A. must not live longer than 25 years. When he attained this age, he was secretly put to death, and buried by the priests in a sacred well, the popular belief being that he cast himself into the water. If, however, he died a natural death, his body was solemnly interred in the Temple of Serapis at Memphis, and bacchanalian festivals were held to celebrate the inauguration of a new bull as A. As soon as a suitable animal was found having the required marks—black color with a white square on the brow; the figure of an eagle on the back, and a knot in the shape of a cantharus under the tongue—he was led in triumphal procession to Nilopolis at the time of the new moon, where he remained 40 days, waited upon by nude women, and was afterwards conveyed in a splendid vessel to Memphis. His Theophany, or day of discovery, and his birthday, were celebrated as high festivals of seven days'

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duration during the rise of the Nile. The worship of the golden calf by the Israelites in the wilderness, and also the employment of golden calves as symbols of the Deity by Jeroboam, have been very generally referred to the Egyptian worship of Apis.

A'PIS, APIDÆ: see BEE.

AP'ISH, etc.: see under APE.

A'PIUM: see CELERY.

APLACENTALIA, n. plu. *ăp'lăs-ĕn-tā'lĭ-ă* [Gr. *a*, without; Eng. *placenta*]: the section of the Mammalia, including the Didelphia and Monadelphia, in which the young is not furnished with a placenta. See PLACENTA.

APLANATIC, a. *ăp'lăn-ăt'ĭk* [Gr. *a*, without; *planăō*, I wander]: applied to a telescope or lens which entirely corrects the aberration of the rays of light.

APLOMB, n. *ă-plŏm'* or *ă-plŏng'* [F. *à plomb*, to the lead, perpendicular line—*lit.*, true to the plumb-line]: the self-possession which arises from perfect self-confidence; the settling down into its fit place as if it were naturally.

APNŒA, n. *ăp-nē'ă* [Gr. *a*, without; *pne'ō*, I breathe]: loss of breath; suffocation.

APO, *ăp'ō:* a Greek prefix signifying 'away'; 'from.'

APOCALYPSE, n. *ă-pŏk'ă-lĭps* [F.—from L. *apocalyp'sis;* Gr. *apokalup'sis*, an uncovering—from Gr. *apo*, from; *kalup'to*, I cover, or conceal]: an uncovering of hidden things; a revelation; a vision; the last book of the New Testament. See REVELATION OF JOHN. APOCALYPTIC, n. *ă-pŏk'ă-lĭp'tĭk*, or APOC'ALYP'TICAL, a. *-tĭ-kăl*, pertaining to revelation. APOC'ALYP'TICALLY, ad. *-kăl-lĭ.*

APOCALYP'TIC NUMBER: 'the mystical number' 666, spoken of Rev. xiii. 18. As early as the 2d c., the church had found that the name Antichrist was indicated by the Greek characters expressive of this number; while others believed it to express a date. Various interpretations have been suggested; but the mystery remains. One of the most probable interpretations is that which was current in the days of Irenæus, and which found the number in the word *Lateinos* (*Latinus*) applied to pagan Rome. The Roman nation—the mightiest pagan power on earth—was the most terrible symbol of Antichrist, and the number 666 appears in the Greek characters which spell the name. Many Protestant controversialists have supported their views by this interpretation, applying the prophecy to papal Rome; but this opinion of late finds fewer advocates among Protestant scholars.

APOCARPOUS, a. *ăp'ō-kär'pŭs* [Gr. *apo*, from; *karpos*, fruit]: applied to fruits when their carpels are either quite separate or only partially united. A. FRUITS, in *bot.*, are those fruits which are the produce of a single flower, and are formed of only one carpel, or of a number of carpels remaining free and separate from each other.

A POCO A POCO, *ä pō'kō ä pō'kō* [Ital.]: in Music, by degrees; by little and little.

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APOCOPE, n. *ă-pŏk'ō-pē* [Gr. *apo*, from; *kopto*, I cut]: omission of the last letter or syllable of a word. APOC'OPAT'ED, a. shortened by cutting off the last letter or syllable.

APOCRENIC ACID, *ă-po-krĕn'ĭk-*: one of the products of the natural decay of wood and other plant textures; found wherever lignine or woody fibre is decomposing in soils, etc. As A. A. is soluble in water, it follows that rain-water falling on and percolating through soils containing this substance, becomes impregnated with it; and hence, in many natural waters, A. A. is a recognized constituent. A. A. performs an important function in the growth of plants, as there is every reason to believe that it forms one of the stages through which matter travels from dead plants again into the living vegetable tissue.

APOCRYPHA, n. *ă-pŏk'rĭ-fă* [Gr. *apo*, from, or intensive; *krupto*, I hide]: things wholly kept back or concealed; certain disputed books received as parts of inspired Scripture by Rom. Catholics and others, but generally rejected by Protestants. APOCRYPHAL, a. *ă-pŏk'rĭ-făl*, doubtful; uncertain. APOC'RYPHALLY, ad. *-lĭ*. APOC'RYPHALNESS, n.

APOC'RYPHA, or APOCRYPHAL WRITINGS: originally meant *secret* or *concealed*, and was rendered current by the Jews of Alexandria. In the earliest churches, it was applied with very different significations to a variety of writings. Sometimes it was given to those whose authorship and original form were unknown; sometimes to writings containing a hidden meaning; sometimes to those whose public use was not thought advisable. In this last signification, it has been customary, since the time of Jerome, to apply the term to a number of writings which the Septuagint had circulated among the Christians, and which were sometimes considered as an appendage to the Old Testament, and sometimes as a portion of it. The Greek Church, at the Council of Laodicea (360), excluded them from the canon; the Latin Church, on the other hand, always highly favored them; and finally the Council of Trent (1545-63) placed them on an equality with the rest of the Old Testament. The Church of England uses them in part for edification, but not for the 'establishment of doctrine.' All other Protestant churches in England and America reject their use in public worship. But it was formerly customary to bind up the A. between the authorized versions of the Old and New Testaments, though this has now ceased, and, as a consequence, this curious, interesting, and instructive part of Jewish literature is now known to comparatively few besides scholars. The Old Testament A. consists of 14 books: 1. First Esdras (q.v.); 2. Second Esdras (q.v.); 3. Tobit (q.v.); 4. Judith (q.v.); 5. The parts of Esther not found in Hebrew or Chaldee; 6. The Wisdom of Solomon; 7. The Wisdom of Jesus, son of Sirach, or Ecclesiasticus (q.v.); 8. Baruch (q.v.); 9. The Song of the Three Holy Children; 10. The History of Susanna; 11. The History of the Destruction of Bel and the Dragon (q.v.); 12. The Prayer of Manasses.

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King of Judah (see MANASSEH); 13. First Maccabees (q.v.); 14. Second Maccabees (q.v.). The precise origin of all of these writings cannot be ascertained. It is enough to state here that some bear traces of a Palestinian, others of an Egypto-Alexandrine, and others, again, of a Chaldaico-Persian origin or influence. Most, if not all, bear internal evidence of having been composed in B.C. 1st and 2d c.

The A. of the New Testament may be arranged under three heads: 1. The writings comprising the *Apocryphal Gospels*, which consist of 22 separate documents, 10 in Greek and 12 in Latin. They concern themselves with the history of Joseph and the Virgin Mary before the birth of Christ, with the infancy of Christ, and with the history of Pilate. The most important of the set are the *Protevangelium of James*, the *Gospel of Thomas*, and the *Acts of Pilate*, which are perhaps the *origines* of all the apocryphal traditions. That many of the stories found in these were current in the 2d c. is abundantly proved, but we have no evidence that any of the books known as Apocryphal Gospels were then in existence, or are older than the 4th c. 2. The *Apocryphal Acts of the Apostles*, consisting of 13 documents originally written in Greek, but found also in a Latin compilation probably of the 6th c. They are distinguished from the Apocryphal Gospels by having less of miracle and more of didactic discourse. The more important of the collection are *The Acts of Peter and Paul*, *The Acts of Barnabas*, *The Acts of Philip*, *The Acts of Andrew*, *The Acts of Bartholomew*, and *The Acts of John*. It is difficult to ascertain their age. Some are probably of earlier date than the Apocryphal Gospels, but the original MSS. are lost, and we have them only in late transcripts of the middle ages. 3. The *Apocryphal Apocalypses*, consisting of seven documents, four of which are called apocalypses by their authors. There is great and perplexing variety in the MSS. That called *The Apocalypse of Moses* relates rather to the Old Testament than to the New; so does *The Apocalypse of Esdras*, a weak imitation of the Fourth Book of Esdras. The others are *The Apocalypse of Paul*, *The Apocalypse of John*, and *The Assumption of Mary* in three forms. These, too, exist only in late MSS. of the middle ages, and it is, of course, not quite certain that they are the same in form as the works bearing the same name referred to in the writings of the Fathers. The New Testament A. throws a flood of light upon the workings of the early Christian consciousness, and enables us to see the superiority of the canonical Scriptures.—See Tischendorf's *Prolegomena* to the Apocryphal Literature of the New Testament (Leipsic, 1873); Clark's *Ante-Nicene Christian Library*, vol. 16 (Edinburgh, 1870); Baring-Gould, *Lost and Hostile Gospels* (1874); B. Harris Cowper, *The Apocryphal Gospels* (5th ed. 1881); and Canon Churton, *The Uncanonical and Apocryphal Scriptures* (1885).

APOCYNACEÆ, *ă-pŏs'ĭ-nā'sē-ē*, or APOCY'NEÆ: a natural order of Dicotyledonous plants consisting of trees and shrubs, generally with milky juice, having entire leaves, and no stipules. The calyx is usually 5-partite, persistent;

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the corolla hypogenous, monopetalous, often with scales in its throat, regular, 5-lobed, twisted in bud. There are five stamens, which are inserted on the corolla; the anthers adhere firmly to the stigma, to which the pollen is immediately applied; the anthers are 2-celled, and open longitudinally; the pollen is granular. The ovaries are two, each 1-celled; or one, 2-celled; ovules usually numerous; styles one or two; the stigma is contracted in the middle, and peculiarly characteristic of the order. The fruit is a follicle or capsule, or drupe or berry, double or single. The seeds have a fleshy or cartilaginous albumen, or (rarely) are ex-albuminous. There are about 566 known species, chiefly natives of tropical countries. The PERIWINKLE (q.v.) is its only representative in the flora of Britain, a wanderer, as it were, from the tropics, yet hardy enough for the climate with which it has to contend; the OLEANDER (q.v.) and a few others are found in the s. of Europe. Many species are poisonous; among which is the noted TANGHIN (q.v.) or TANGHEENA of Madagascar. Some are used in medicine, in India and other countries. A number of species yield CAOUTCHOUC (q.v.). The milk of others is bland and wholesome, as the HYA HYA or COW-TREE (q.v.) of Demerara. Some are used in dyeing; *Wrightia tinctoria* yields indigo of good quality. A number yield eatable fruits, as *Willughbeia edulis* and *Carissa Carandas* in India; *Carissa edulis* in Arabia, and certain species of *Carpodinus*, called PISHAMIN in Sierra Leone, and *Hancornia*. *Apocynum cannabinum*, Indian hemp, a herbaceous plant about 4—5 ft. in height, with unbranched stem, oblong leaves, and lateral cymes of whitish bell shaped flowers, yields a very strong fibre, which the Indians of North America employ for making twine, cloth, fishing-nets, etc.

APODA, n. plu. *ăp'ō-dă* [Gr. *a*, without; *podes*, feet]: those fishes which have no ventral fins. APODAL, a. *ăp'ō-dăl*, destitute of feet; applied also to such fishes as the eel, sword-fish, wolf-fish, etc., which have no ventral fins. In the Linnæan system, the *Apodes* are an order of Fishes, in which genera not otherwise nearly allied are brought together; but in the systems of Cuvier and other recent naturalists, a less important place is assigned to this distinctive character. APODIA, n. *ăp-ō'di-ă*, the absence of feet.

APODEMA, n. plu. *ăp-ŏd'ĕ-mă* [Gr. *apo*, from; *dĕma*, a cord, a bond; *demăta*, cords or bonds]: certain appendages on the bodies of Articulata giving attachment to muscles, or articulating with wings and the like. APODEMATA, n. plu. *ăp'ō-dĕm'ă-tă*, certain chitinous septa which divide the tissues in the Crustacea.

APODICTIC, *ăp'ō-dĭk'tĭk:* a logical term signifying a judgment or conclusion which is necessarily true; or, in other words, a judgment of which the opposite is impossible. No. A. judgment can be founded on experience, because experience does not supply the idea of an absolute necessity.

APODIXIS, n. *ăp'ō-dĭks'is* [L. *apŏdix'is;* Gr. *apodeix'is*, a setting forth—from Gr. *apo*, *deik'numi*, I show]: full

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demonstration. APODICTIC, a. *ăp'ō-dĭk'tĭk*, or AP'ODIC'TICAL, a. *-tĭ-kăl*, evident beyond contradiction; clearly proving. AP'ODIC'TICALLY, ad. *-lĭ*.

APODOSIS, n. *ă-pŏd'ō-sĭs* [G. *apŏdŏsis*, conclusion—from *apo*, from; *didōmi*, I give]: in *gram.*, the consequent clause in a conditional sentence, expressing the result—the clause expressing the condition being called the *protasis*.

APOGEE, n. *ăp'ō-jē* [Gr. *apo*, from; *gē*, the earth] properly speaking, the greatest distance of the earth from any of the heavenly bodies. Its application, however, is restricted to the sun and moon, the sun's A. corresponding to the earth's aphelion, and the moon's A. being the point of its orbit most remote from the earth. A. is opposed to perigee. APOGEAN, a. *ăp'ō-jē'ăn*, pertaining to.

APOLDA, *â-pŏl'dâ:* town of the grand duchy of Saxe-Weimar-Eisenach, Germany; on the Werlitz, a feeder of the Saale, 8 m. n.e. from Weimar. It is a station on the Thuringian railway, between Weimar and Weissenfels, and a place of much industrial activity, having extensive manufactures of hosiery. Pop. (1894) 20,880.

APOLLINARIS, *a-pŏl-ĭ-nā'rĭs*, the Younger: Bishop of Laodicea in Syria (362); and one of the warmest opponents of Arianism. Both as a man and as a scholar, he was held in the greatest reverence; and his writings were extensively read in his own day. His father, A. the Elder, who was presbyter of Laodicea, was born at Alexander, and taught grammar, first at Berytus, and afterwards at Laodicea. When Julian prohibited the Christians from teaching the classics, the father and son endeavored to supply the loss by converting the Scriptures into a body of poetry, rhetoric, and philosophy. The Old Testament was selected as the subject for poetical compositions after the manner of Homer, Pindar, and the tragedians; while the New Testament formed the groundwork of dialogues in imitation of Plato. It is not ascertained what share the father had in this work, but as he had a reputation for poetry, he probably put the Old Testament into Greek verse. But it was chiefly as a controversial theologian, and as the founder of a sect, that A. the Younger is celebrated. He maintained the doctrine that the *logos*, or divine nature in Christ, took the place of the rational human soul or mind, and that the body of Christ was a spiritualized and glorified form of humanity. This doctrine was condemned by several synods, especially by the Council of Constantinople (381), on the ground that it denied the true human nature of Christ. The heresy styled Apollinarianism spread rapidly in Syria and the neighboring countries, and, after the death of A., divided itself into two sects—the Vitalians, named after Vitalis, Bp. of Antioch; and the Polemeans, who added to the doctrine of A. the assertion that the divine and human natures were so blended as one substance in Christ that his body was a proper object of adoration. On this account they were accused of *sarcolatria* (worship of the flesh) and *anthropolatria* (worship of man), and also were styled *synousiastai* (*syn*, together, and *ousia*, substance), because they confused to-

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gether the two distinct substances. The whole controversy, which occupied a great part of the 5th c., is an instance of human reason wandering out of its proper sphere. A. must not be confounded with Claudius A., Bp. of Hierapolis, in Phrygia (170).

APOLLINARIS WA'TER, *ă-pŏl-lĭ-nā'rĭs:* alkaline mineral water containing carbonate of soda, from the Apollinaris Spring, in the valley of the Ahr, in the Rhine province. It is largely imported into the United States.

APOLLO, n. *ă-pŏl'lō* [L. and Gr. *apŏllōn*]: a god of the anc. Greeks and Romans, worshipped under various names. A. may be regarded as the characteristic divinity of the Greeks, inasmuch as he was the impersonation of Greek life in its most beautiful and natural forms, and the ideal representative of the Grecian nation. His mild worship, with its many festivals, accompanied as they were by cessation from all hostilities; his various shrines at sacred places, with their oracles, and the general idea of his character, had a wide, powerful, and beneficent influence on social and political life throughout the states of Greece. Homer and Hesiod mention that he was the son of Zeus and Leto, but neither states were he was born. The Ephesians believed that both he and Diāna, his sister, were born in a grove near their city. The Tegyræans of Bœotĭa, and the inhabitants of Zoster in Attica, also claimed the honor of his birth; while the Egyptians seemed to think he properly belonged to them; but the most popular legend was that which made him a native of Delos, one of the Cyclades, where his mother Leto, followed by the jealous wrath of Juno over land and sea, at length found rest and shelter, and was delivered of him, under the shadow of an olive-tree, at the foot of Mount Cynthus. To spite the Queen of Heaven, who was far from being a favorite with the other goddesses, these hastened to tender their services to the weak and wearied Leto. The young A. was the object of great regard and care. Themis fed him with nectar and ambrosia, the food of the gods, which seems to have suddenly excited the conceit of the infant deity, inasmuch as he surprised his nurse by starting to his feet, demanding a lyre, and announcing his intention to reveal the will of Jove.

In ancient literature A. is described as possessed of many and various powers, all of which, however, are seen on closer inspection to be intimately related to each other. He is spoken of: 1. As the god of retributive justice, who, armed with bow and arrows, sends down his glittering shafts upon insolent offenders. In this character he appears in the opening of the *Iliad*. 2. As the instructor of bards, and the god of song or minstrelsy, playing upon the phorminx, or seven-stringed lyre, and singing for the diversion of the other deities when engaged in feasting. 3. As the god of prophetic inspiration, especially in his oracle at Delphi. 4. As the guardian deity of herds and flocks. 5. As the god of medicine, who affords help, and wards off evil. In this sense he is represented as the father of Asclepius (Æsculapius), the god of the healing art. 6. As a founder of cities. According to Homer, he assisted Neptune in

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building the walls of Troy. Cyrene, Naxos in Sicily, and other cities, venerated A. as their founder. By the later writers, A. was identified with Helios, the sun-god, though Homer describes the latter as a distinct deity. Several critics, however, have regarded Helios, or the sun-god, as the true original A.—an opinion which may be supported by many probabilities. The supposition that A. was identical with the Egyptian deity Horus was rejected by the learned O. Müller, who generally opposed all attempts to deduce Grecian from Egyptian mythology. According to Müller's theory, A. was a purely Doric deity, whose first residence was in Tempe, and who afterwards removed to Delphi, whence the fame of his oracle was spread abroad, and made him to be recognized as the national divinity of Greece. The introduction of his worship into Attica appears to have been contemporaneous with the immigration of the Ionians, and that worship seems to have spread over the Peloponnesus, immediately after it was conquered by the Dorians. Much controversy has taken place, both with reference to the idea which lies at the root of the whole myth of the A. worship, and also as to whether this myth had its origin in the north of Greece or in Egypt. Even on the supposition that the original conception was derived from the latter source, it was to Greek art and philosophy that it owed its development into the ideal of humanity. The most celebrated oracles of A. were at Delphi, Abæ in Phocis, Ismenion in Thebes, Delos, Claros, near Colophon, and Patara in Lycia. Among the Romans, the worship of A. was practiced as early as B.C. 430, and prevailed especially under the emperors. But there can be no doubt that the Romans derived their conceptions of A. entirely from the Greeks. It was in honor of A. and his sister Diana that the *ludi sæculares* were celebrated every hundred years. The attributes of A. are the bow and quiver, the cithara and plectrum, the snake, shepherd's crook, tripod, laurel, raven, etc.; less frequently, the grasshopper, cock, hawk, wolf, and olive-tree. In sculpture, he is generally represented with a face beautifully oval, high forehead, flowing hair, and slender figure.

Apollo.

APOLLO BELVEDERE, *ă-pŏl'lō bĕl've-dēr':* a celebrated statue of antiquity, generally regarded as embodying the highest ideal of manly beauty. It is usually supposed to represent the 'lord of the unerring bow' in the moment of his victory over the Python, but numerous other explanations have been suggested. The figure (upwards of 7 feet in height) is naked, but a cloak fastened round the neck hangs gracefully over the extended left arm; the expression of the face is one of calm and godlike triumph, mixed with 'beautiful disdain.' This great work of art was discovered in 1503,

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amid the ruins of the ancient Antium, now Capo d'Anzo, and purchased by Pope Julius II., who placed it in the Bel-

Apollo Belvedere.

vedere of the Vatican, whence the name it bears. The date of its execution is with probability referred to the reign of Nero, but the name of the artist is a matter of mere conjecture. The left hand and the right fore-arm, wanting in the statue as discovered, were restored by G. A. da Montorsoli, a pupil of Michael Angelo.

APOLLODORUS, *a-pŏl-ō-dō′rŭs:* lived abt. B.C. 408: Athenian painter, predecessor of Zeuxis. He introduced improved coloring and distribution of light and shade.

APOLLODORUS: Greek grammarian, lived about B.C. 140, studied philosophy in Athens, and grammar under Aristarchus; wrote a work on mythology, giving an arrangement of old myths from the earliest times to the historical period; also a geography, a chronicle in iambic verse, and several grammatical works. The mythology, which begins with the origin of the gods, probably went down as far as the Trojan cycle, but a portion of it has perished. It has been reckoned by some only an extract from a larger work by A., though this is mere hypothesis. An edition of the *Bibliotheca* of A. was published 1783, by Heyne, and one by Hercher 1874.

APOLLODORUS: celebrated architect in the time of the emperor Trajan, by whom he was employed to construct a bridge over the Danube in Lower Hungary. His severe censure, boldly pronounced on a design for a temple of Venus, which the emperor Hadrian had sent to him, caused A. to be sentenced to death, A.D. 129.

APOLLONIUS, *ăp ŏl-lō′nĭ-ŭs*, surnamed DYSCOLOS (or ill-tempered), of Alexandria: Greek grammarian, 2d c. Some of his grammatical works were edited by Bekker. A. was the first who reduced grammar to a system. His repu-

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tation was so high, that Priscian calls him *grammaticorum princeps* (prince of grammarians).

APOLLONIUS, son of Archebulus of Alexandria: lived in the time of Augustus; author of a lexicon of Homeric words.

APOLLONIUS, surnamed Molon: teacher of rhetoric at Rhodes, and also gave lectures at Rome, where he was highly esteemed by Cicero and Cæsar.

APOLLONIUS OF PERGA: B.C. 240; is classed with Euclid, Archimedes, and Diophantus, as one of the founders of the mathematical sciences His work on conic sections has been preserved, partly in the original Greek, partly in an Arabic translation.

APOLLONIUS OF RHODES (or of Alexandria, say some authorities): b. B.C. 235; wrote many works on grammar, and an epic poem, entitled the *Argonautica*, marked rather by learning and industry than by poetical genius, though it contains some truly artistic passages, such as those exhibiting the growth of Medea's love. It was greatly admired by the Romans, was translated into Latin by Publius Terentius Varro, and was imitated, not only in a wholesale manner by Valerius Flaccus, but even by Virgil in some passages. It has been edited by the German scholars Brunck and Wellauer (1813–28), and by Keil (1853–54).

APOLLONIUS, OF TY'ANA, in Cappadocia: lived in the time of Christ; a zealous follower of the doctrines of Pythagoras. He soon collected a considerable number of disciples, travelled through a great part of Asia Minor, and endeavored to find his way to India, in order to become acquainted with the doctrine of the Brahmins. On this journey he stayed for a time in Babylon, was introduced to the Magi, and at last reached the court of King Phraortes, in India, who recommended him to Jarchas, the principal Brahmin. When A. returned from this pilgrimage, his fame as a wise man was greatly increased; the people regarded him as a worker of miracles and a divine being, and princes were glad to entertain him at their courts. He himself seems to have claimed insight into futurity, rather than the power of working miracles. From Rome he was expelled on a charge of having raised a young woman from the dead. After extensive travels in Spain, Italy, Greece, and Ethiopia, he was accused of having taken part in an insurrection against Domitian; but appeared before the tribunal, and was acquitted. Ultimately, he appears to have settled in Ephesus, where he opened a Pythagorean school, and continued his teaching until he died, nearly one hundred years old. His history was written about a hundred years after his death by Philostratus (q.v.). It contains a mass of absurdities and fables, through which an outline of historical facts and the real character of the man are sufficiently discernible. Hierocles, a heathen statesman and opponent of Christianity, wrote, in the 3d c., a work on the life and doctrines of A., with a view to prove their superiority to the doctrine of Christ. In modern times, the notorious English freethinker Blount, and Voltaire in France, have renewed the attempt.

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APOLLONIUS OF TYRE: hero of a Greek romance, which enjoyed great popularity in the middle ages, and was translated into almost all the languages of Western Europe. In it are related the romantic adventures which befell A., a Syrian prince, previous to his marriage with the daughter of King Alcistrates, of Cyrene. To these are added the adventures of his wife, who was parted from him by apparent death, as well as those of his daughter, Tarsia, who was carried off by pirates, and sold in Mitylene. The poem closes with the reunion of the whole family. The original Greek work no longer exists; but there are three very early Latin versions, of which one was published by Welser (Augsburg, 1595); another is to be found in the *Gesta Romanorum;* and the third in the *Pantheon* of Gottfried of Viterbo. From this Latin source have proceeded the Spanish version of the 13th c., printed in Sanchez' *Colleccion de Poesias Castellanas* (2d edition, Paris, 1842), several French versions, in prose and verse, as well as several Italian. As early as the 11th c. there was an Anglo-Saxon adaptation of the work, and subsequently various English ones appeared. Shakespeare has treated the subject in his drama of *Pericles;* he substantially follows Gower, in his *Confessio Amantis*, who bases his narrative on the *Pantheon* of Gottfried of Viterbo. Three popular English stories, drawn from a French version of this romance, appeared in London, 1510, 1576, and 1607; while the Dutch, 1493, derived theirs from the German. The romance was rendered into German, probably from the *Gesta Romanorum*, by a certain 'Heinrich von der Neuenstadt' (i.e., Vienna), about 1300, in the form of a long, and as yet unpublished poem. Later we have a *Histori des Küniges Appolonii*, translated from Gottfried of Viterbo; first published at Augsburg, 1476. Simrock, in his *Sources of Shakspeare*, narrates the story as it is given in the *Gesta Romanorum*. A modern Greek translation of the Latin romance, undertaken in 1500 by Gabriel Contianus, of Crete, and several times reprinted at Venice, must not be confounded with the lost Greek original.

APOLLYON, n. *ă pŏl'ĭ-ŏn* or *-yŏn* [Gr. *apol'luō*, I destroy]: a name used in the Revelation of St. John to designate the destroying angel of the bottomless pit.

APOLOGUE, n. *ăp'ŏ-lŏg* [F. *apologue*—from Gr. *apolŏgŏs*, a fable]: a fable, parable, or short story, intended to serve as a pleasant vehicle of some moral doctrine. One of the oldest and best apologues or parables is that by Jotham, Judges. ix. 7–15. Another celebrated A. is that of the 'Limbs and the Body,' related by the patrician Menenius Agrippa. Æsop's fables are apologues that have a world-wide reputation. Luther held such an opinion of the value of the A. as a vehicle of moral truth, that he edited a revised Æsop, especially for young people, for which he wrote a characteristic preface.

APOLOGY, n. *ă-pŏl'ō-jĭ*, APOLOGIES, plu. *-ō-jĭz* [Gr. *apolog'ĭă*, apology—from *apo*, from; *logos*, speech: F. *apologie*, apology]: a speech in defense or excuse; an excuse; a defense. APOLOGETIC, a. *ă-pŏl'ō-jĕt'ĭk*, or APOL'OGET-

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ICAL, a. *-jĕt'ĭ-kăl*, excusing; defending by words. APOL'OGET'ICALLY, ad. *-lĭ*. APOLOGETICS, n. plu. *ă-pŏl'ō-jĕt'ĭks*, that branch of theology which defends the Scriptures, and sets forth the evidence of their divine authority. APOLOGIST, n. *ă-pŏl'ō-jĭst*, or APOL'OGIZ'ER, n. *-jĭz'ĕr*, one who makes an apology, or writes in defense of another. APOLOGIZE, v. *ă-pŏl'ō-jĭz'*, to make an excuse for; to speak in defense of. APOL'OGIZ'ING, imp. APOL'OGIZED', pp. *-jĭzd'*.—SYN. of 'apology': defense; justification; exculpation; excuse; plea.

APOL'OGY: the term is now commonly understood as synonymous with an excuse for defect, mistake, misdeed, breach of an engagement, etc., but was originally used as the title of any work written in defense of certain doctrines, as in the *A. of Socrates*, ascribed to Plato and Xenophon; the *A. for the Christians*, by Tertullian, and in many other defenses of the Christians, written by Justin Martyr, Athenagoras, Tatian, Theophilus, Origen, Eusebius, Minucius Felix, Arnobius, Lactantius, Augustine, Orosius, and others. The A. in some cases became rather a polemic. The attacks parried or retorted in these apologetical works are such as charges of atheism, want of philosophical knowledge, antisocial tenets, etc. Both the charges and the refutations brought forward serve to give us an insight into the character of the times when these works were written. Thus, in the A. by Tertullian, it is curious to find a formal argument employed to refute the assertion that the spread of Christianity was the cause of 'earthquakes' and other natural phenomena which had occurred in some parts of the Roman empire. After the 4th c., when the church was made dominant under the Roman emperors, apologetical writings were less called for; but Bartholus Edessenus and Raymundus Martinus wrote against the Jews and the Mohammedans. In the 15th c., when the revival of learning placed Christianity in apparent opposition to the Platonic philosophy, Marsilius Ficinus wrote in defense of revelation; and some time after the Reformation, the spread of freethinking, and skepticism in England was opposed by a variety of apologetical works, chiefly maintaining the points that Christianity is a divine revelation, Christ a divine messenger, and his church a divine institution. The defense of Christianity on grounds of reason came now to be treated as a distinct branch of theology, under the name of *Apologetics*. Among the numerous apologetic works by Protestants, are those by Grotius (*De Veritate*, etc.), Butler (*Analogy of Religion, Natural and Revealed*), Lardner (*Credibility of the Gospel History*), Leland, Addison, Soame Jenyns (*Internal Evidences of the Christian Religion*), Hugh Farmer, Bishop Watson (*A. for Christianity*), Paley (*Evidences of Christianity*, and *Horæ Paulinæ*), Chalmers, the Bampton Lectures (q.v.), etc. Among the Rom. Cath. writers, the most eminent are Pascal, Houtteville, Guenée, Bergier, Mayr, and Chateaubriand.

Recently, a great number of apologetic works by Neander, Tholuck, and others have appeared, in reply to Strauss's *Life of Jesus*, and the *Vie de Jésus* by Ernest Renan.

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APOMORPHINE, n. *ăp'ŏ-mŏr'fĭn* [Gr. *apo*, from; Eng. *morphine*]: a valuable and powerful emetic obtained from morphine by heating with hydrochloric acid.

APON: see AMBOYNA.

APONEUROSIS, n. *ăp·ŏn'ū-rō'sĭs*, APON'EURO'SES, plu. *-rō'sēz* [Gr. *aponeuro'sis*, the end of a muscle—from *apo*, from; *neuron*, a nerve, a muscle]: the extremity of a muscle where it becomes a tendon; the fibrous sheath of a muscle, or investment of a part. For the sake of convenience, A. in Anatomy is generally confined to expansions from the tendons of muscles, as the lumbar A. If a tendon is very broad and expanded, as that of the external oblique muscle of the abdomen, it is said to be aponeurotic. Some muscles, as those on the shoulder-blade, are partially covered with a tendinous expansion, to which some of their fibres are attached; this is termed the aponeurotic *origin* of the muscle; it gives the muscle a more extensive attachment without adding materially to weight. Aponeuroses stretch in some localities as protections over large arteries; thus, in bleeding from the vein nearest the inside of the bend of the elbow, the only structure between it, the lancet, and the brachial artery, is an aponeurotic expansion from the biceps tendon into the muscles of the forearm. See FASCIA.

APOPETALOUS, a. *ăp'ŏ-pĕt'ă-lŭs* [Gr. *apo*, from; *pĕtălon*, a petal]: in *bot.*, applied to corollas whose petals are perfectly distinct and disconnected; the opposite of *gamopetalous*.

APOPHTHEGM or APOTHEGM, n. *ăp'ŏ-thĕm:* see APOTHEGM.

APOPHYLLOUS, a. *ă-pŏf'il-ŭs* [Gr. *apo*, from; *phullon*, a leaf]: in *bot.*, applied to perianths whose parts are distinct and separate.

APOPHYSIS, n. *ă-pŏf'ĭ-sĭs* [Gr. *apo*, from; *phuo*, I grow]: in *anat.*, a process or protuberance on the surface of a bone; in *bot.*, any irregular swelling on the surface; a tubercle at the base of the seed-vessel of certain mosses.

APOPLEXY, n. *ăp'ŏ-plĕk-sĭ* [Gr. *apoplex'ĭă*, stupor—from *apo*, from; *plesso*, I strike]: a disease or an affection of the brain that causes stupor; a fit in which all sensation and power of movement are suspended. APOPLECTIC, a. *ăp'ŏ-plĕk'tĭk*, or AP'OPLEC'TICAL, *-tĭ-kăl*, pertaining to the disease of apoplexy. APOPLEX, n. *ăp'ŏ-plĕks*, for APOPLEXY.

APOPLEXY: an engorgement of blood, with or without extravasation, in or upon any organ, as the brain (*cerebral* A.), the *spinal* cord or lungs (*pulmonary* A.). As popularly used, the term denotes vaguely a condition arising from some disturbance within the head. A. occurs in *fits*, which may be sudden or come on by degrees. They are characterized by loss of sense and motion, speechlessness and heavy sleep, with stertorous respiration and a slow pulse. The fit may last from a few hours to two or three days, and passes off, leaving generally more or less paralysis, and recurs at intervals of months or years. The *age* at which

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Apollo, from a bas-relief at Rome.

Long armed Ape (*Hylobates Camboja*).

Aoudad (*Ammotragus tragelaphus*).

Sand-eel (*Ammodytes tobianus*), one of the Apoda.

Apocarpous Fruit of Aconite.

Branch of Apple with young Fruit; *a*, piece of the blossom.

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A. occurs most commonly is from fifty to seventy, and is comparatively rare before and after these ages. Cerebral A. may arise from mere congestion of the blood-vessels of the brain, caused by impeded return of the venous blood, as from the military stock, worn in some armies, pressing on the jugular veins, keeping the head long in one position, or turning it quickly. Stout persons, with short necks, are more liable to this form of A.; though lean persons are also frequently its victims. But in addition to congestion, there may be an escape of the watery portion of the blood from the congested vessels, and this collecting, produces *serous* A.; or, owing to a diseased condition of the arterial walls, the vessels may burst, and A. from cerebral hemorrhage be the result; the latter is the most common, and is usually preceded by some softening of the brain substance itself. If this bleeding be to any great extent, death results; if only a small quantity escapes, it coagulates, and forms a clot, which is absorbed in time. Persons with diseased heart and lungs, and pregnant females, are liable to apoplectic fits. The attack is generally preceded by vertigo, headache, partial or temporary loss of memory, and occasionally double vision. When these warnings occur, medical advice should be sought to correct the digestive functions; and by relieving the oppressed brain, ward off the fit. When the latter occurs, the patient's head should be raised, cold applied, and in some cases blood should be withdrawn from the temporal artery or external jugular vein. As soon as possible, purgative medicines should be administered. For the results of A., see PARALYSIS. Tumors within the skull produce symptoms of A.

APOSEPALOUS, a. *ăp'ō-sĕp'ăl-ŭs* [Gr. *apo*, from, and *sepalous*]: in *bot.*, consisting of distinct and separate sepals or calyx leaves.

APOSIOPESIS, n. *ă-pŏs'ĭ-ō-pē'sĭs* [Gr. and L. *apos'ĭō-pēsis*—from Gr. *apo*, from; *sĭōpa'ō*, I am silent]: a rhetorical device by which, for emphasis, modesty, or any other effect, a speaker abruptly breaks off.

APOSTASIS, n. *ă-pŏs'tă-sĭs* [Gr. *apŏstăsis*, distance from, an interval—from *apo*, from; *stăsis*, a standing]: in *bot.*, the separation of the whorls of leaves, or floral coverings, by an unusual length of the internodes.

APOSTASY, n., or APOSTACY, n. *ă-pŏs'tă-sĭ* [L. and Gr. *apostăs'ĭă*, a standing off from—from *apo*, from; *stasis*, a placing, a standing]: a departure from a former profession or belief. APOSTATE, n. *ă-pŏs'tāt*, one who forsakes his former principles or party—usually in a bad sense: ADJ. false; traitorous. AP'OSTAT'ICAL, a. *-tăt'ĭ-kăl*, after the manner of an apostate. APOSTATIZE, v. *ă-pŏs'tă-tīz*, to forsake a former profession or belief. APOS'TATIZ'ING, imp. APOS'TATIZED, pp. *-tīzd*.

APOSTATE, *ă-pŏs'tāt*: applied especially to one who changes his religion, and, by custom, always in a condemnatory sense, as equivalent to renegade, or one who changes his creed from unworthy motives. In early Christian times, the word was applied to those who abandoned their faith in

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order to escape from persecution; but it was applied also to such as rejected Christianity on speculative grounds (the emperor Julian, for instance). After the 5th c., when heathenism was declining, many who had no sincere belief in Christianity, yet made profession of it, and were baptized: these also were styled apostates. The apostates in times of persecution were styled variously Sacrificati, Thurificati, etc., according to the modes in which they publicly made known their return to heathenism, by offering sacrifices or incense to the gods of Rome. The Rom. Cath. Church at one period imposed severe penalties on apostasy. The A. was of course excommunicated; sometimes also his property was confiscated, and he himself banished, or even put to death. It has often been of great moment to the fortunes of a nation that a prince has apostatized. The most renowned instance in modern history is that of Henry IV. of France. In 1833, there was published, at Erlangen, *A Gallery of Important Persons who in the 16th, 17th, and 18th Centuries went over from the Protestant to the Roman Catholic Church.*—The term APOSTASY is now employed commonly, and often abusively, as a reproach for great or sudden changes in political opinions.

APOSTEME, n. *ăp'ŏs-tēm* [OF. *apostume*—from L. and Gr. *apŏstē'mə*, an abscess]: a swelling filled with purulent matter; an abscess: the incorrect spellings, IMPOSTHUME and IMPOSTUME, are commonly used.

A POSTERIORI, a. *ā'pŏs-tē'rĭ-ōr'ī* [L. *a*, from; *postĕrĭŏr*, after, latter]: arguments in reasoning drawn from consequences, effects, or results. See A PRIORI.

APOSTILL or APOSTIL, n. *ā-pŏs'tĭl* [F. *apostille*, a postscript—from mid. L. *a*, to; *postilla*, notes added to references: the abbreviation of L. *post illa verba auctōrĭs*, after those words of the writer]: a marginal note on a letter or other written document; a postscript.

APOSTLE, n. *ă-pŏs'sl* [Gr. *apŏstŏlos*, one sent out or forth—from *apo*, away; *stello*, I send]: one sent out by another; a person sent to perform important business; one of the apostles, the immediate followers of Christ. APOS'TLESHIP, n. the office or dignity of an apostle. APOSTOLIC, a. *ăp'ŏs-tŏl'ĭk*, or AP'OSTOL'ICAL, a. *-ĭ-kăl*, relating to the apostles or to the office of an apostle. AP'OSTOL'ICALLY, ad. *-lĭ*. AP'OSTOL'ICALNESS, n. APOSTOLATE, n. *ă-pŏs'tō-lăt*, a mission, the dignity or office of an apostle. APOSTOLICITY, n. *ă-pŏs'tō-lĭs'ĭ-tĭ*, the state or quality of being apostolical. APOSTOLIC FATHERS, the early Christian writers, generally of the first century—commonly restricted to Polycarp, Clement, Ignatius, Hermas, and Barnabas. APOSTOLIC SEE, a title applied to the government of the pope of Rome in reference to his claim of being the successor of St. Peter. See APOSTOLIC SUCCESSION: ETC.

APOSTLE: any messenger whatever, but especially used to denote the twelve disciples whom Jesus sent forth to preach the gospel. Their names were Simon Peter, Andrew, John (the son of Zebedee), James (his brother), Philip, Bartholomew (called also Nathaniel), Thomas, Matthew (sur

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named Levi), James (the son of Alphæus), Thaddeus, Simon, and Judas Iscariot. Subsequently, Matthias was chosen in the room of Judas; and at a still later period, the number of the apostles was further increased by the calling of Paul to the apostleship. The term is sometimes used in the New Testament in its more general signification; thus Barnabas is styled an A. (Acts xiv.). It is a point of controversy between the supporters and opponents of episcopacy, whether or not the term A., as indicating an office, is applied to any except the original twelve, Matthias, and Paul; it being maintained, on the one hand, that the office is perpetuated in bishops; on the other, that it was temporary and belonged exclusively to those who were witnesses to the resurrection of Christ, and were employed by him to found the Christian Church. The apostles were twice commissioned by their Master to go forth on their work of evangelization. First, during the third year of his public ministry. On this occasion, their labors were to be restricted to the Jews, properly so called. Not even the Samaritans, though natives of Palestine, were to be the objects of their religious solicitude. They were earnestly to seek out the lost sheep of the house of Israel. The second time was shortly before the Lord's ascension, when their sphere of labor was indefinitely extended: 'Go ye therefore, and make disciples of all the nations, baptizing them in the name of the Father and of the Son and of the Holy Ghost' (Matt. xxviii. 19, 20). On the day of Pentecost, the apostles received miraculous gifts fitting them for their arduous work. And after evangelizing for some years in Palestine, they all departed, with the exception of James, into various quarters of the globe; but the region of their ministry seems to have principally comprised the civilized provinces and cities of the eastern part of the Roman empire—viz., Syria, Asia Minor, and Greece; though probably Peter, and after him Paul, visited Rome. There is no historical foundation for the tradition that the first apostles divided the then known world into twelve parts, each taking one of these for his special sphere of labor. This figment was very likely originated by two circumstances: 1. That the disciples were commanded to go into all the world and preach the gospel; and 2. That the disciples in point of fact had little personal intercourse with each other. Their zeal for the propagation of Christianity left them no time to gratify their social inclinations. As a consequence, we have very imperfect accounts of their lives or manner of death.

The several apostles are usually represented in mediæval pictures with special badges or attributes: St. Peter, with the keys; St. Paul, with a sword; St. Andrew, with a cross; St. James the Less, with a fuller's pole; St. John, with a cup and a winged serpent flying out of it; St. Bartholomew, with a knife; St. Philip, with a long staff, whose upper end is formed into a cross; St. Thomas, with a lance; St. Matthew, with a hatchet; St. Matthias, with a battle-axe; St. James the Greater, with a pilgrim's staff and a gourd-bottle; St. Simon, with a saw; and St. Jude, with a club.

APOSTLES' CREED: see CREED.

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APOSTOLIC, or APOSTOLICAL: general term applied to everything derived directly from, or bearing the character of the apostles. Either case constitutes apostolicity. The Rom. Cath. Church declares itself the A. Church; the papal chair the A. chair, on the ground of an unbroken series of Roman bishops, from the chief apostle, Peter. The Church of England, in virtue of regular episcopal ordination from the pre-reformation church, claims to be A.; so likewise do the Protestant Episcopal Churches in Scotland and the United States. Apostolic Tradition (see TRADITION) claims to have been handed down from the apostles. In the same special sense, the name of A. Council belongs to that conclave of the apostles at Jerusalem (Acts xv.), about 51 or 52, occasioned by the disputes raised at Antioch by Judaizing Christians as to the admission of uncircumcised Gentiles into the church. Certain congregations or churches, also, which were the special scenes of the labors of the apostles, bore for centuries the title of A. Churches, more especially those of Jerusalem, Antioch, Ephesus, Corinth, and Rome. But with the ever-increasing spiritual power of the Roman hierarchy, the name A. came to be more and more exclusively applied to Rome, and is retained by her, despite the energetic protests of the Protestant Churches. Hence the term Apostolic See, i.e., the see of Rome; Apostolic Blessing, the blessing of the pope as the successor of St. Peter; Apostolic Vicar, the cardinal who represents the pope in extraordinary missions; Apostolic Chamber, a council intrusted with the care of the revenues of the see of Rome; Apostolic Months—January, March, May, July, September, November—the months in which the pope, according to the Vienna Concordat of 1448, took possession of the vacant benefices in Germany, etc. A papal brief or letter is styled A. in the same sense.

APOSTOLIC BRETHREN, or APOSTOLICI: the name given in Italy, towards the end of the 13th c., to one of those sects which, animated by the spirit of an Arnold of Brescia, felt constrained to oppose the worldly tendencies of the church. Its founder was Gerardo Segarelli, a weaver in Parma. Rejected, from some cause or other, by the Franciscan order, his long-continued and enthusiastic meditations led him to the profound conviction that it was above all things necessary to return to the simple forms of apostolic life. Acordingly, he went about (1260) in the garb of the apostles, as a preacher of repentance, and by his practical discourses gathered many adherents into a kind of free society, bound by no oaths. At first he managed to avoid any direct collision with the dogmas of the church; but after twenty years of undisturbed activity and growing influence, Segarelli was arrested by the Bp. of Parma; and in 1286, upon the occasion of his release, Pope Honorius IV. renewed a decree of Pope Gregory X. against all religious communities not directly sanctioned by the papal chair. In 1290, Nicholas IV. setting himself expressly to oppose the A. B., they, on their side, began avowedly to denounce the papacy, and its corrupt and worldly church, as the Babylon of the Apocalypse. In 1300, many, both men and women, and

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among them Segarelli, as having, after abjuration, relapsed into heresy, perished at the stake. But his cause survived him. Dolcino, a more energetic and cultivated man, brought up as a priest, who had previously been active in the Tyrol against the corruptions of the church, now headed the orphan sect in Italy. He taught the duty of a complete renunciation of all worldly ties, of property and settled abode, etc. Having retreated into Dalmatia, he announced thence the dawning of a new era, and in 1304, reappeared in Upper Italy, with thousands of adherents, as the enemy of the papacy—at that time humbled and impoverished by France. In 1305, a crusade was preached against him. He fortified the mountain Zebello, in the diocese of Vercelli, but was, after a gallant defense, compelled by famine to submit. After horrible tortures, which he bore with the utmost fortitude, he was burned. In Lombardy and the s. of France, remnants of the A. B. lingered on till 1368. See Krone, *Fra Dolcino und die Patarener.* (Leipsic, 1844.)

APOSTOLIC CANONS AND CONSTITUTIONS: both ascribed by tradition to Clemens Romanus; notes of ecclesiastical customs held to be apostolical, written in the form of apostolic precepts. The *Constitutiones Apostolicæ*, eight books, were composed probably in Syria, and contain, in the first six books, a comprehensive rule for the whole of Christian life. These were probably written about the end of the 3d c.; but the seventh book, essentially an abridgment of them, may have belonged to the beginning of the 4th c. The eighth book was put together in the middle of the 4th c., for the use of the priests, and relates only to the sacred offices. Interpolations, however, were afterwards introduced. The *Canones Apostolici*, also recognized by the church, were composed later. The first fifty, compiled in the middle of the 5th c., and translated from Greek into Latin by Dionysius the Younger, were acknowledged by the Latin Church alone. The Greek Church, on the other hand, accepted the thirty-five canons put forth in the beginning of the 6th c.; and this became a point of discord between the churches. Both collections were probably looked upon at first as apostolic traditions merely. Later, it came to be believed that they were written down by the apostles themselves, it being thought probable that they should have expressed themselves positively about the constitution as well as the dogmas of the church.

APOSTOLIC CATHOLICS: see IRVINGITES.

APOSTOLIC FATHERS: the immediate disciples and fellow-laborers of the apostles; and in a more restricted sense, those among them who have left writings. The A. F., specially so called, are Barnabas, Clement of Rome, Ignatius of Antioch, and Polycarp of Smyrna. It is uncertain whether Papias of Hierapolis, and the author of the *Shepherd*, were really disciples of the apostles. The writings of the A. F., as to their form and subject, may be looked upon as a continuation of the apostolic epistles, though far inferior to them in spirit. Their main purpose is to exhort to faith and holiness before Christ's coming again.—Editions of the

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A. F. were published by Cotelerius (Par. 1672), Jacobson (Oxford 1838), Hefele (1839), and Dressel (1857); another by Zahn, Gebhardt, and others began to appear in 1875. There are several English translations, including one in Dr. Donaldson's *Ante-Nicene Library*, vol. i. (1867).

APOSTOLIC MAJESTY: a title held by the kings of Hungary, conferred by Pope Sylvester II., A. D. 1000, upon Duke Stephen of Hungary, who had not only much encouraged the progress of Christianity in Hungary, but actually preached himself, in imitation of the apostles. In 1758, the title was renewed by Pope Clement XIII., in favor of Maria Theresa as queen of Hungary, and continues to be used by the emperor of Austria as king of Hungary.

APOSTOLIC PARTY: a party conspicuous in the modern history of Spain; composed of fanatical Catholics, who were also absolutists so far as the king consented to be their instrument. They formed themselves (soon after the revolution of 1819) into the A. P., whose leaders were fugitive priests, and whose troops were smugglers and robbers. After being active in all the subsequent agitations, they finally merged (1830) in the Carlist party.

APOSTOLIC SUCCESSION: common phrase used to denote one or both of *two* things—the derivation of holy orders by an unbroken chain of transmission from the apostles, and the succession of a ministry so ordained to the powers and privileges of the apostles. The former is necessarily a matter of fact, to be ascertained by history; the latter is rather a matter of opinion—the Roman and Protestant Churches, and again individuals and parties in either, differing widely from each other in their views. See BISHOP: ORDINATION.

APOSTROPHE, n. *ă-pŏs'trŏ-fē* [Gr. *apostrophē*, a turning away—from *apo*, away; *strepho*, I turn—*lit.*, a turning away from the subject]: a sudden breaking off a subject, and addressing a present, an absent, or an imaginary being; a mark (') put in a word to show the omission of a letter or letters, or merely as the sign of the possessive case in nouns. APOSTROPHIC, a. *ăp'ŏ-strŏf'ĭk*, pertaining to an apostrophe. AP'OSTROPH'ICALLY, ad. *-lĭ*. APOSTROPHIZE, v. *ă-pŏs'trŏ-fīz*, while speaking, to turn aside and address formally any one present or absent. APOS'TROPHIZ'ING, imp. APOS'TROPHIZED, pp. *-fīzd*.

APOSTROPHE, in Rhetoric: a figure by which a speaker, changing the course of his speech, addresses, with greater or less emotional emphasis, persons present or absent, the dead, or inanimate objects, either to invoke them as witnesses, or to pity, honor, praise, or blame them. When the figure is well managed, it has a thrilling effect, both in oratory and poetry; but when extravagantly introduced, it becomes ludicrous. Examples of it abound in the writings and speeches of the great poets and statesmen both of ancient and modern times.—A. in Grammar, is the omission of a letter or letters in a word, the omission being marked by a comma, as *'tis* for *it is;* the comma so employed is also called an *A*.

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APOTHECARY, n. *a-pŏth'ē-kăr-ĭ*, [L. *apothēca*, a storehouse: Gr. *apothēkē*, a store or keeping-place—from *apo*, from; *thēkē*, a box or chest]: person trained in pharmacy, who prepares and sells drugs and medicines (see CHEMISTS AND DRUGGISTS): formerly, in England and Ireland, one of the members of a lower branch of the medical profession, licensed not only to sell drugs and medicines, but also to practice the healing art.

In England, the business or profession of an A., although not regulated, nor, indeed, fully recognized till modern times, was the subject of several ancient statutes, and is traceable to a remote period. Richard Fitznigel, who died Bp. of London, is stated to have been A. to Henry II.; and it is an accredited tradition, that in 1345 King Edward III. gave a pension of sixpence a day to Coursus de Gangland, an A. in London, for taking care of and attending him during his illness in Scotland. In 1543, parliament passed a curious act whose preamble deals severely with the ignorance and cupidity of the London surgeons; and provides for the toleration and protection of the irregular practitioners, who afterward, as a body, acquired the distinctive name apothecaries. This act complains that the surgeons of London were not only unskilful, but that they 'have sued, troubled: and vexed divers honest persons, as well men as women, whom God had endued with the knowledge of the nature, kind, and operation of certain herbs, roots, and waters, and the using and ministering of them to such as had been pained with customable diseases'; and it ordains that thereafter it shall be lawful for such persons so to use and minister their knowledge of medicines and of the art of healing.

Anciently, the apothecaries were not distinguishable from the grocers (the surgeons being, in like manner, undistinguishable from the barbers); indeed, it appears that apothecaries and grocers were synonymous terms. In a charter of 1606, the two bodies were expressly united; and it was not till 1617 that they were formed into two distinct corporations by a charter from James I. In 1815, the apothecaries, as a body, were placed on the footing of a liberal profession.

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APOTHE'CIA: see LICHENS.

APOTHECIUM, n. *ăp'ō-thē'shĭ-ŭm* [Gr. *apothēkē*, a store—from *apo*, from; *thēkē*, a box or chest]: in *bot.*, a cluster or case of spore-cells in lichens, frequently cup-shaped.

APOTHEGM, n. *ăp'ō-thĕm* [Gr. *apŏphthĕg'ma*, a thing uttered—from *apo*, from; *phthĕgma*, a word]: a thing uttered; a sententious saying; a pithy, instructive remark: the oracles of the heathen gods often took this form, as also the proverbs, memorable sayings, etc., of the sages of antiquity. Lord Bacon made a charming collection of apothegms. APOTHEGMATIC, a. *ăp'ō-thĕg-măt'ĭk*, or AP'OTHEGMAT'ICAL, a. *-ĭ-kăl*, after the manner of an apothegm. AP'OTHEG'MATIST, n. one who utters short maxims, or a maker of them. The old spelling is APOPHTHEGM.

APOTHEOSIS, n. *ăp'ō-thē'ō-sĭs* [L. and Gr. *apŏtheōsis*, a deification—from *apo*, from; *theos*, God—*lit.*, from a man to a god]: in ancient Greece and Rome, the ceremony of placing some illustrious man among their gods; a deification, or the raising of a mortal to the rank of a god. From the polytheistic point of view there is nothing monstrous in this idea; on the contrary, it is quite natural, and a necessary part of the system. Among heathens generally, especially among the Romans, every departed spirit became a deity (see MANES); 'and as it was common for children to worship (privately) the manes of their fathers, so was it natural for divine honors to be *publicly* paid to a deceased emperor, who was regarded as the parent of his country.' (See SMITH'S *Dictionary of Greek and Roman Antiquities*.) At the *Consecratio*, as it was called, of a Roman emperor, the body was burnt on a funeral pile, and as the fire ascended, an eagle was let loose to mount into the sky, carrying, as was believed, the soul of the emperor from earth to heaven. Many medals are found with the word *consecratio* surrounding an altar, with fire on it, and an eagle rising into the air.

APOTHESIS, n. *ă-pŏth'ĕ-sĭs* [Gr. *apothĕsis*, a putting back or away—from *apo*, from; *thesis*, a putting or placing]: in primitive churches, a place on the south side of the chancel fitted with shelves for books, vestments, etc.

APOTOME, n. *ă-pŏt'ōmē* [Gr. *apotŏmē*, a cutting off—from *apo*, from; *tomē*, a cutting or lopping]: in *math.*, the difference between two incommensurable quantities.

APOTREPSIS, n. *ăp-ŏ-trĕp'sĭs* [Gr. *apotrepsis*, aversion]: in *med.*, the resolution of a suppurating tumor.

APOTROPY, n. *a-pŏt'rō-pĭ* [L. *apotropæ*—from Gr. *apotropaios*, averting evil]: in *Greek poetry*, a verse or hymn designed to avert the wrath of incensed deities. The divinity chiefly invoked on such occasions was Apollo.

APOZEM, n. *ăp'ŏ-zĕm* [L. *apozema*: Gr. *apozema*—from *apozein*, to extract by boiling—from *apo*, from; *zein*, to boil]: a decoction; an extraction of the substance of plants by boiling them and preserving the infusion. APOZEMICAL, a. *ăp'ŏ-zĕm'ĭk-ăl*, pertaining to, or resembling an apozem.

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APPAL or **APPALL**, v. *ăp-pawl'* [W. *pallu*, to fail; *pall*, loss of energy (see PALL 2): usually referred to L. *ad*, at; *pallēō*, I become pale]: to lose the vital powers through sudden terror; to fill with dismay. APPALL'ING, imp. APPALLED', pp. *-pawld'*. APPALL'MENT, n. state of being filled with dismay. APPALL'INGLY, ad. *-lĭ*. OLD APPALL'ED WIGHT, in *OE.*, a man who has lost his vigor through age. *Note.—Appall* is simply *ap* and *pall*, 'to cause to pall,' 'to stupefy with horror,' and ought not to be confused with *pale*, from *palleo;* OF. *je appalys;* compare It. *abbagliārē*, to dazzle or hurt the sight by excessive light.—SYN. of 'appal': to dismay; daunt; terrify; frighten; scare.

APPALACHEE BAY, *ăp-pă-lăch'ē:* a portion of the Gulf of Mexico on the Florida coast, lat. 30° n.; long. 84° 15′ w. Its breadth is abt. 90 m., and it extends 50 m. inland. St. Mark's and several smaller rivers flow into it.

APPALACHEES: Choctaw tribe of Indians in Florida, on Appalachee Bay. At first friendly to the Spaniards, they afterwards revolted against the oppressions of the whites, and a number of hostile outbreaks occurred. They ceased to be a tribe of importance after 1722.

APPALACHIAN CLUB, *ăp'pa-lā'chĭ-an:* organization similar to the Alpine clubs of Europe (see ALPINE CLUB), originating in Boston about 1876, and having its principal field of labor in the great Appalachian mountain range. The objects sought are systematic exploration of the principal mountains, formation of new paths, placing of guide-boards, and prevention of the painting of advertisements on rocks and of other disfigurements of the natural scenery. Discoveries and observations in geology, botany, zoology, and other sciences, are reported; much valuable information is thus accumulated. A large proportion of the members are residents of New England, but people of other sections are cordially received. Many professional men and a large number of amateur scientists belong to the organization, and find both health and pleasure in prosecuting its work.

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APPALACHIANS, *ăp'pa-lā'chĭ ans:* general appellation of the great mountain-system—called also the Alleghanies—which stretches from the interior of Maine to the borders of Alabama, its distance from the sea gradually ranging between about 100 m. in the n. and about 300 in the s. Generally this chain may be regarded as the parent of the Atlantic rivers of the United States on the one side, and on the other of the s. tributaries of the St. Lawrence, and of the e. feeders of the Mississippi: it is not, however, the actual watershed during its entire length, for it is crossed by the Connecticut, the Hudson, and the Delaware, as the Himalayas are pierced by the Ganges, and the Andes by the Amazon. The chain, in fact, consists of several ranges generally parallel to each other, which, with the intermediate valleys that occupy two-thirds of the breadth, form a belt 100 m. wide—its multiform character, however, developing itself only to the w. and s. of the Hudson. The following are the chief ridges, beginning from the n.: the White Mountains (or Hills) of New Hampshire present some of the loftiest elevations, Moose Hillock and Washington being respectively 4,636 and 6,285 ft. above the sea. Next, the Green Mountains, which, true to the name, almost cover Vermont, attain, in Killington Peak, a height of 3,924 ft.; then come the Highlands, on the e. of the Hudson, so striking an object to the voyagers on its waters; immediately beyond that river we find the Catskill Mountains, which, though of inconsiderable length, contain two eminences—Round Top and High Peak—respectively of 3,804 and 3,718 ft.; while on a terrace of another member of the group, 2,500 ft. above the Hudson, is perched the Mountain House, a favorite refuge from the heats of summer; other great summer hotels occupy other eminences of this group. The Kittatinnies extend from the n. of New Jersey as far as Virginia; while nearer the sea the Blue Ridge, stretching from about the same parallel down to North Carolina, is crowned, within the limits of Virginia, by the Peaks of Otter, 4,000 ft. high. In North Carolina are the Black Mountains, with the highest summit of the system, Black Dome, 6,760 ft.; Mt. Mitchell, 6,701 ft.; Guyot's Peak, 6,661; Sandoz Knob, 6,612; in all about a dozen peaks now known to be higher than Mt. Washington. Lastly, there lie, more to the w., the Alleghanies proper in Pennsylvania and Virginia, and the Cumberland Mountains on the e. border of Kentucky and Tennessee.

Of all these elevations not one at all approaches the limit of perpetual snow. Yet France, while struggling with England in North America, regarded the A. as a wall that was physically to exclude her rival from the basins of the St. Lawrence and the Mississippi. Virtually the supposed barrier has been levelled from end to end. Through Maine, New Hampshire, and Vermont runs a railway from Portland to Canada; by canal or by railway, even by both abreast, New York has reached the waters of the St. Lawrence on at least four principal points between Montreal in the e. and Buffalo in the w.; Pennsylvania has carried to Pittsburgh a railway of 248 m. from Harrisburg, and a canal of 312 m. from Columbia; while, with the necessary exception of little Dela-

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ware alone, each of the remaining states along the coast has its iron-way through the Appalachians.

The chain abounds in coal and iron; and it is a curious instance of the adaptation of the two worlds to each other, that, while the Spaniard met in the s. the gigantic counterparts of the central plateau of his own romantic land, the Englishman in the n. stumbled, as it were, on those same elements of almost creative energy which, within two centuries, were to be instrumental in placing the daughter with the mother among the foremost nations of the earth. As an evidence of the actual value of the coal and iron of the A., Pennsylvania—where, hitherto, they have been chiefly found—has since 1840 made more rapid strides in population than any other state in the Union, till between 1860 and 1870, when Illinois and other n.w. states increased more rapidly. Nor are iron and coal the only valuable products of the A.: the mountains yield abundance of limestone, marble, slate, building stone, copper, zinc, chrome, etc.

Geology.—During the Azoic and Palæozoic periods, the district now occupied by the A. was a plain. These mountains date their origin subsequent to the Carboniferous epoch. The coal measures are the newest upturned beds associated with the Appalachian range; and as the stratified rocks, with few exceptions, are laid down horizontally, these strata must owe their inclined position to the dislocating agency which elevated the mountains; they, consequently, supply a date anterior to its activity. At the base of the A., on their e. side, there are a series of red sandstone beds, unconformable to the upturned strata, and occupying the valleys in their original horizontality, thus evidently unaffected by the disrupting agency which must have been active prior to their deposition. These beds have been referred by geologists to different ages. That they are Old Red Sandstone, as conjectured by Maclure and others, is now universally denied. Hitchcock's supposition that they were Permian is also considered as referring them to too remote a geological age. W. B. Rogers considered them first as members of the Triassic period; but has since, from evidence adduced from the contained organic remains, shown reason for relating them to the beginning of the Jurassic period. We thus obtain two grand limiting dates—the Carboniferous and Jurassic periods—within which the A. must have been formed. There are grounds for being even more specific, and referring the period of the dislocating agency to that immediately subsequent to the Carboniferous, represented in the stratified rocks of other districts by the Permian series; for the older upturned rocks had not only been ruptured and plicated, but also denuded into the various shapes that they now present, before the horizontal rocks were deposited.

The aggregate thickness of the Palæozoic, measured in Pennsylvania, amounts to 35,000 ft. While exhibiting a remarkable variety of mineral character, they may be classed under the three great divisions of sedimentary rocks, viz., sandstones, slates, and limestones. Intercalated with them, as subordinate layers, there occur deposits of coal, chert, and iron ore. They are all more or less fossiliferous.

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Coal Measures.—The character of the rocks of the Appalachian district of N. Amer. indicates that during the Carboniferous epoch, a slow subsidence was in progress, the trough filling with the materials for sandstone and shale, afterward raised. There seem to have been vast, interior, marshy levels of such a character as to be able to support the vegetation, which has become, in the course of ages, converted into coal. The coal-fields to the far w. of the A., in Michigan, Indiana, Illinois, and Missouri, have been connected with the Appalachian coal formation, which includes all the detached basins, both anthracitic and semi-bituminous, of the mountain chain of Pennsylvania, Maryland, and Virginia, and also the vast bituminous trough lying to the n.w. in Pennsylvania, Ohio, Virginia, Kentucky, Tennessee, and Alabama.

On the e. slope of the A., the coal, from its proximity to the region of greatest disturbance, has lost nearly all its volatile constituents, and is converted into hard shining anthracite (q.v.). In the troughs to the w. of the great Appalachian valley, where the forces that disturbed the crust were not so intense, the coal has not parted with such a large proportion of volatile matter, but still is so much altered as to be characterized as semi-anthracite. Both the anthracite and semi-anthracite are extensively mined for economical purposes, but their extent as well as their value is of little importance compared with the enormous Appalachian bituminous coal-field. From northern Pennsylvania to middle Alabama, its length is about 875 m., and its greatest breadth between southern Pennsylvania and northern Ohio is about 180m.; its area is abt. 56,000 sq. m., almost the largest expanse of coal measures in the world. A single coal-seam in this field has been traced over an extent of country 225 m. long by 100 broad, showing a superficial area of 14,000 sq. m. The actual depth of workable seams in the deepest part of this basin is estimated at 40 ft.; but when the amount of denudation of the upper measures over large districts is taken into account, the average depth of the entire field cannot be more than 25 ft. Taking this as the thickness, the amount of coal in this great coal-field would be 1,387,500,000,000 tons. When this is compared with the estimated quantity of coal in the British coal-fields, viz., 140,000,000,000 tons, some conception may be formed of the enormous extent of coal existing in this district of N. America.

Metals.—Extensive beds of magnetic, hematitic, and fossiliferous iron ores occur in many of the formations of the A., from the lowest metamorphic gneiss to the highest coal-measures. Iron ore is extensively wrought in Pennsylvania and Ohio, large quantities of the anthracite being used in the smelting furnaces. Veins of lead occur in the Metamorphic rocks, rarely stretching up into the red slate. In the Palæozoic beds, veins of copper and nickel occur in sufficient quantity to be wrought.

APPALACHICOLA, *ăp'pa-lăch'ĭ-kō'la:* river rising in Georgia, flowing through Florida into the Gulf of Mexico, or rather into the A. Bay. From the head-waters of the

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Chatahooche, the A. is about 400 m. long, navigable for boats through nearly its entire course. It is, however, only at the junction of the Chatahooche with the Flint that the name of A. is applied to the stream; and up to this point, a stretch of about 70 m., there is a sufficient depth of water for steam-navigation; while the tides also ascend for about two-thirds of the distance.—A. is also a seaport at the mouth of the stream above mentioned, where is shipped the produce of the river-basin, chiefly large quantities of cotton.

APPANAGE, *ăp'păn-āj* [F. *apanage*, an appanage—from OF. *apaner*, to nourish: mid. L. *appanā'gium*, any pension or alimentation—from *ad*, to; *panis*, bread]: an allowance for bread and other victuals; lands set aside for the maintenance of younger sons of a prince; sustenance; wealth. A. is a technical term in French law, signifying the assignment or conveyance by the crown of lands and feudal rights to the princes of the royal family, for their maintenance according to their rank. See this title in Knight's *Political Dictionary;* also in Merlin's *Répertoire de Jurisprudence.* The word occurs in Scotch law-books, probably derived from the French. It is not a term in English law, though used in common parlance to denote any extra-territorial jurisdiction or sovereignty by governments; and even any dignity or right pertaining to a person of rank. The duchy of Cornwall may be said to be an A. of the Prince of Wales, in whose person also now merge the rights of the Prince of Scotland, since the junction of the two kingdoms under the same crown. The Prince of Wales, when he goes north of the Tweed, ought strictly to be called Prince of Scotland.

APPARATUS, n. *ăp'pă-rā'tŭs* [L. *apparātus*, tools or implements—from *ad*, to or for; *parātus* prepared]: things prepared as means to any certain end; a set of instruments, tools, utensils, or mechanical arrangements to be used for a particular purpose; a set of organs uniting for a common function.

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APPAREL, n. *ăp'păr'ĕl* [F. *appareil*, outfit: Sp. *aparejar*, to fit, to suit: L. *ad*, for: mid. L. *paric'ulus*, a dim. of L. *par*, equal, like; hence F. *pareil*, alike—*lit.*, that which is fitted like to like]: clothing; dress: V. to dress; to clothe; to adorn. APPARELLING, imp. *ăp-păr'ĕl-ĭng*. APPARELLED, pp. *ăp-păr'ĕld*.—SYN. of 'apparel, n.': dress; clothing; vesture; garments; attire; array; costume; habit; clothes; vestment; rayment; uniform.

APPARENT, *ăp-pā'rĕnt* [see APPEAR]: term expressing a number of important distinctions, especially in astronomy. The *A. magnitude* of a heavenly body is the angle formed by two lines drawn from the ends of its diameter to the spectator's eye; this obviously depends upon the distance of the body, as well as upon its real magnitude. A planet seen from the surface of the earth seems lower than it would be if seen from the centre of the earth—the former is its *A. altitude*, the latter its real. *A. noon* is when the sun is on the meridian; true or mean noon is the time when the sun would be on the meridian if his motion in the heavens were uniform and parallel to the equator. See EQUATION OF TIME. The daily and annual motions of the sun in the heavens are both *A. motions*, caused by two real motions of the earth.

APPARITIONS, *ăp'pā-rĭsh'ŭnz* [see APPEAR]: ghostly or phantom appearances. The belief in A.—especially of spirits of the departed—has existed in all ages and countries, and usually declines only when a people have advanced considerably in the knowledge of physical conditions and laws. Not that A. then cease to be reported, but that the more intelligent part of the community are then usually able to explain away the alleged occurrence in some way satisfactory to themselves, not involving the projection of a spirit upon the living sense.

Nothing is more certain than that there are conditions of the body when spectral appearances, such as occur to us in uneasy dreams, become sensible to the waking vision. One of these conditions is that of the patient under the disease of *delirium tremens*, who not only hears ideal enemies plotting against his life in adjacent rooms or behind hedges, but thinks he sees them preparing to do him mischief, and has been known to jump overboard of a vessel into the sea, in order to escape the apprehended danger. In such excitements it is, though arising from different causes, that an intending murderer thinks he hears the prince of fallen angels tempting him on to crime, or sees before him a 'dagger of the mind' wherewith to end the life of his victim. There are also instances of spectral illusions traceable to a simply disordered state of the digestive organs. M. Nicolai, an eminent bookseller in Berlin, fell, in the early part of the year 1791, into a depression of spirits, and in that condition neglected a course of periodical bleeding which he had been accustomed to observe. The consequence was his becoming liable for some months to seeing trains of phantasmata or spectral figures, which moved and acted before him, nay, even spoke to, and addressed him. He was fortunately able, not merely to coolly observe the phenomena, but to

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describe them in an ample paper which he presented to the Philosophical Society of Berlin. This case may be said to have formed the basis of a theory of A., advanced by Dr. Ferrier, Dr. Hibbert, and others, amounting merely to this, that they are all to be accounted for by peculiar conditions of the organism of the individual sensible of them. Certainly a large class of cases fall readily under this explanation; but, if we are to accept the whole number of apparitions reported on good authority, a much more comprehensive theory will be found requisite to satisfy the thorough inquirer.

In 1882, the Society for Psychical Research was founded in order to the scientific and systematic investigation of reported apparitions, clairvoyance, haunted houses, hypnotism, thought-reading, and the phenomena called spiritualistic: and it publishes its *Proceedings*. See HYPNOTISM: SOMNAMBULISM: also HALLUCINATIONS.

APPARITION: see under APPEAR.

APPEAL, v. *ăp-pēl'* [L. *appello*, I accuse, I call upon: F. *appeler*, to call; OF. *apeler*, to invoke, to call upon—from *ad*, *pello*, I drive]: to call to or invoke; to apply for justice; to refer a disputed matter to another, as to a higher judge or court, or to a superior; recourse; resort; in *OE.*, to accuse; to charge with crime: N. the removing of a cause from a lower to a higher court; a reference to another; an application for justice. APPEAL'ING, imp. APPEALED, pp. *ăp-pēld'*. APPEALABLE, a. *ăp-pēl'a-bl*, that may or can be appealed. APPELLANT, n. *ăp-pĕl'lănt*, the person who appeals. APPEAL'ER, n. one who. APPELLATE, a. *ăp-pĕl'-lāt*, or, APPEL'LATOR'Y, a. *-ter'ĭ*, relating to appeals. APPELLATION, n. *ăp'pĕl-lā'shŭn*, a name; the word by which a thing is known. APPEL'LATIVE, a. *-tĭv*, pertaining to a common name. N. a common name as distinguished from a proper name. APPEL'LATIVE'LY, ad. *-tĭv'lĭ*. APPELLEE, n. *ăp'pĕl-lē'*, the defendant in an appeal; one tried for a crime at the instance of another—now obsolete. APPELLOR, n. *ăp-pĕl'lŏr*, one who appeals. — SYN. of 'appellation': title; name; description; denomination; designation.

APPEAL, in Law: the right or process of bringing under the notice of a higher court the judgment of a lower court which the appellant represents as erroneous in fact or law. Formerly this right was a valuable guarantee against political oppression and private extortion: for example the A. to royal judges from courts of feudal barons. Now, the object of A. is to secure uniformity in the administration of justice. This is effected not merely by the reversal of erroneous judgments which are appealed, but by the knowledge which every judge has of precedents in the Supreme Court, and that his own judgments are subject to A. The most important questions connected with the modern system of A. are: 1. Whether in all cases, of whatever pecuniary value, A. is allowed, and also whether at all stages, or only after final judgment; 2. On what conditions

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as regards time, *interim* execution, and security for costs, A. is allowed; 3. The relative constitution of the lower and higher courts.

In the civil law, the earliest form of A. was the *provocatio* from the judgment of a criminal court to the Roman people. This fell into disuse under the *Quæstiones Perpetuæ*. The *appellatio* was a veto or interdict granted upon the *intercessio* of one complaining of a judicial act. The subordination of judges increased largely under the empire, and for some time the emperor, who was tribune for life and also proconsul, was the only final court of A. Latterly, the senate and the prætorian prefects also gave final decisions. Only six months were given for A. from the most distant provinces. The law is stated in detail in the Digest, Lib. XLIX.

In the Christian Church, under the judicial system defined in the False Decretals, frivolous appeals direct to the Roman Consistory multiplied enormously. The remonstrances of St. Bernard were gradually given efficiency by the Lateran and Basel councils, and wholesome restrictions on the right of A., and in favor of the independence of Cisalpine church courts, passed into most modern concordats (Fleury, *Inst. du Droit Eccles.*, iv. 23; Lancelot, *Inst. du Droit Canon.*, iii. 17). The famous *appel comme d'abus* in France was originally an A. to civil justice against the encroachments of church jurisdiction. It is evident that the question of A. is closely connected with the great problems of political history—national independence, the relations of central and provincial authorities, etc.

In English law, prior to the Judicature Acts, 1873–75, the word A. was not commonly used. In common law courts, there was a proceeding in 'error' by 'assignment of errors' and 'joinder of errors.' The old 'writ of error' and 'writ of false judgment' are still sometimes used in England in bringing up the proceedings of certain inferior courts. In chancery the A. was formerly called 're-hearing,' the Vice-chancellor being regarded as the delegate of the Lord Chancellor. Under the modern system of 'fusion,' every judgment in the High Court of Justice (except the judgment of the Court of Probate where leave is required) may by simple motion be submitted to the Court of A., to have it reversed, discharged or varied. Interlocutory proceedings in chambers may also be appealed to a judge in chambers; and from him A. lies to the Divisional Court. In the Chancery Division, the judge has the discretion of directing the matter to be argued before him in court, or allowing A. direct to the Court of A. The A. from the London Bankruptcy Court is also to the Court of A. An A. in divorce requires in many cases to be to the 'full court,' not to the ordinary Court of A. This last court consists practically of six Lords Justices of A., sitting in two divisions; one for common law A.; the other for chancery, probate, admiralty, and bankruptcy appeals. As regards A. from the inferior courts in England, an A. lies from the county court to a divisional court of the High Court of Justice, if the judgment has been pronounced in the ordi-

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nary or admiralty jurisdiction of the county court, but to the London Bankruptcy Court, if the judgment has been pronounced in the bankruptcy jurisdiction of the county court.

In American Law, A. is the removal of a cause from a court of inferior to one of superior jurisdiction, in order to obtain a review of the proceedings and a re-trial. While a writ of error carries to the higher court only matter of law for re-examination, an appeal subjects both the law and the facts to review and re-trial, the whole case being examined and tried, precisely as if it had not been tried before. While an appeal is pending, no action can be taken on the judgment of the inferior court, or until after the final decision of the cause. In the matter of the regulation of appeals, the rules differ widely in the different states, while the federal courts have a practice of their own.

APPEAR, v. *ăp-pēr'* [L. *ap'parērĕ*, to come in sight—from *ad*, to; *parĕō*, I am seen, I appear: F. *apparoir*]: to be visible; to come in sight; to seem; to present one's self. APPEAR'ING, imp. APPEARED, pp. *ăp-pērd'*. APPEARANCE, n. *ăp-pēr-ăns*, a coming in sight; the thing seen; the look of a person or thing; show or exhibition of one's self; pretense; show. APPEAR'ER, n. the person that appears. APPARENT, a. *ăp-pā'rĕnt*, that may be easily seen; obvious; plain; in *science*, not real—as *apparent motion*. APPA'RENTLY, ad. *-lĭ*, manifestly; clearly; openly; seemingly. APPARITION, n. *ăp'pă-rĭsh'ŭn*, a ghost; a spectre; a supposed visible spirit. APPARITOR, n. *ăp-păr'ĭ-tĕr*, the attending officer of an ecclesiastical court; a summoner.—SYN. of 'appearance': air; aspect; figure; mien; manner; semblance; look; pretense; arrival; coming;—of 'apparent': clear; visible; manifest; obvious; plain; conspicuous; evident; distinct; certain; notorious;—of 'apparition': ghost; spectre; phantom; vision; phantasm.

APPEASE, v. *ăp-pēz'* [F. *apaiser*, to appease—from L. *ad*, *pacem*, peace]: to put into a state of peace; to quiet; to pacify. APPEAS'ING, imp. APPEASED, pp. *ăp-pēzd'*. APPEAS'ER, n. one who. APPEASE'MENT, n. state of being appeased or in peace. APPEASABLE, a. *ăp-pē'zăbl*, that may be appeased. APPEAS'ABLENESS, n. the quality of being appeasable. APPEAS'IVE, a. *-zĭv*, quieting. APPEAS'IVELY, ad. *-lĭ*.—SYN. of 'appease': to alleviate; pacify; mitigate; soothe; assuage; allay; relieve; quiet; conciliate; propitiate; compose; calm; hush; cool; tranquillize.

APPEND, v. *ăp-pĕnd'* [F. *appendre*, to hang up—from L. *appendĕrĕ*, to hang to—from *ad*, to; *pendĕō*, I hang]: to attach or hang to; to add to. APPEND'ING, imp. APPEND'ED, pp. APPENDAGE, n. *ăp-pĕn'dăj*, or APPEN'DANT, n. something added to without being essentially necessary. APPEN'DANT, a. belonging to; attached. APPENDICLE, n. *ăp-pĕn'dĭ-kl*, a small appendage. APPENDIX, n. *ăp-pĕn'dĭks*; APPEN'DIXES, n. plu. *-dĭks-ĕz*, or APPEN'DICES, n. plu. *-dĭ-sēz* [L. *appendix*]: something appended or added, as at the end of a book; a supplement. APPENDICULATE, a. *ăp'pĕn-dĭk'ŭl-āt* [L. *appendic'ulă*, a small

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appendage]: in *bot.*, having a little appendage, as the scaly appendages of corollas, or found at the base of certain filaments.—SYN. of 'append': to add; annex;—of 'appendage': addition; adjunct; concomitant.

APPENDICITIS, n. *ăp-pĕn-dī-sī'tĭs* [L. from *appendix*]: inflammation of the vermiform appendix (see APPENDIX VERMIFORMIS). One, not the usual, cause may be lodgment of a foreign body, such as fruit-pits, or a small mass of hardened fæces, in the cavity of the vermiform appendix. An inflammation, from whatever cause being set up on the inner coat of the appendix, extends, and attacks the middle, and lastly the external coat, or peritoneum. The result is usually a localized peritonitis (perityphlitis), though it may become general. The intestinal tract never being in an aseptic condition, septic infection followed by suppuration is common, with perforation of the appendix and discharge of pus into the abdominal cavity. A. is best treated with perfect rest in bed and with a bland non-irritating fluid diet. Quietude of the intestines is secured by opiates. If perforation occurs, the only hope is in a surgical operation.

APPENDIX VERMIFORMIS, *ăp-pĕn'dĭks vĕr-mĭ-fôrm'ĭs* [L. *appendix*, appendage; *vermiformis*, worm-shaped]: in *anat.*, the vermiform appendix, a blind, worm-shaped process given off from the cæcum (q.v.): in man it is of about the calibre of a goose-quill, and 3–6 in. long. Its functions are unknown. It is sometimes the seat of very dangerous inflammation: see APPENDICITIS.

APPENZELL, *ăp-pĕnt-sĕl'* [from *Abbatis Cella*]: canton in the n.e. of Switzerland; 162 sq. m. Divided into two districts—Innerrhoden and Ausserrhoden, the former of which is peopled by Rom. Catholics, the latter by Protestants, and noted for its dense population. The surface is mountainous, especially in the s., where Mount Sentis attains an elevation of 8,232 ft. The chief river is the Sittern, which flows through the centre of the canton. A. holds the 13th place in the Swiss confederacy; the constitution of each half of the canton is a pure democracy. The inhabitants are chiefly employed in agriculture, cattle-keeping, cotton manufactures, and embroidery. They are fond of dancing, music, and athletic exercises, and have the reputation of being first-rate marksmen. Pop. (1894) 66,997.

APPENZELL, cap. of the canton of A., is on the left bank of the Sittern; lat 47° 29′ n., and long. 9° 24′ e. Pop. 4,000: see also HERISAU (pop. 11,000).

APPERCEIVE, v.: in *OE.*, for PERCEIVE.

APPERCEPTION, n. *ăp'pĕr-sĕp'shŭn* [*ad*, and *perception*]: degree of perception which becomes conscious of itself (used in psychometry); *a priori* self-consciousness.

APPERIL, n.: in *OE.*, for PERIL.

APPERLEY, *ăp'pĕr-lĭ*, CHARLES JAMES: 1777–1843, May 19; b. Denbighshire, Wales: enthusiastic hunter, the 'Nimrod' of the *Quarterly Review*, and writer of articles on hunting in the *Sporting Magazine*. See *The Chase, the Turf, and the Road*, *Quarterly Review* (1827).

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APPERT, *ap-pār'*, BENJAMIN NICOLAS MARIE: b. Paris, 1797, Sep. 10: French philanthropist. He devoted himself to physical and moral reforms in prisons and hospitals, and to improvement in schools. Among his works are *Dix Ans à la Cour du Roi Louis Philippe;* and *Conférences contre le Système Cellulaire*, opposing solitary confinement.

APPERT, FRANÇOIS: b. France: inventor of a method of preserving meat, vegetables, etc., without use of salt, described in his work (Paris 1831).

APPERTAIN, v. *ăp'pĕr-tān'* [mid. L. *apper'tinĕrĕ*—from *pertinĕrĕ*, to pertain to, to belong—from L. *ad*, to; *per*, through; *tenĕo*, I hold: F. *appartenir*]: to belong to as of right; to belong to; to relate to. AP'PERTAIN'ING, imp. AP'PERTAINED', pp. *-tānd'*. AP'PERTAIN'MENT, n. that which appertains to. APPERTENANCE, n. *ăp-pĕr'tĕ-nāns*, that which relates to another thing. APPER'TINENT, a. belonging: N. that which belongs to anything else.

APPETENT, a. *ăp'pĕ-tĕnt* [L. *ap'pĕtens* or *appĕten'tem*, eager for—from *ad*, for; *pĕto*, I seek, I desire]: seeking eagerly for; desiring; very desirous. AP'PETENCE, n. *-tĕns*, or AP'PETEN'CY, n. *-tĕn'sĭ*, eager desire; appetite; the propensity in living creatures to select and feed upon such substances as are suited for their nourishment. APPETIBLE, a. *ăp'pĕ-tĭ-bl*, pleasing; desirable. APPETIBILITY, n. *ăp'pĕ-tĭ-bĭl'ĭ-tĭ*. APPETITE, n. *ăp'pĕ-tīt* [F. *appetit*, appetite—from L. *appetitus*, eager desire]: the natural desire or craving for food or drink; a strong desire for anything that affords pleasure. APPETITIVE, a. *ăp'pĕ-tĭ'tĭv*, desiring gratification. APPETIZING, a. *ăp'pĕ-tīz'ĭng*, that creates or promotes a desire to eat, as *appetizing* food.—SYN. of 'appetite': passion; appetency; desire; a longing; a craving; eagerness; hunger.

APPETITE: see DIET: DIGESTION: FOOD AND DRINK.

APPIANI, *ăp-e-ä'nē*, ANDREA: 1754, May 23–1817, Nov. 8; b. Milan: styled in his day 'the Painter of the Graces.' His poverty compelled him to gain a subsistence by decorative painting; but in the course of his travels he studied the works of great masters, and formed for himself an original style, almost rivalling that of Correggio. At Rome, he devoted his attention to the frescoes of Raphael, and made such progress, that he soon excelled all living artists in fresco-painting. The best evidences of his genius are found in the cupola of the church of *Sta. Maria di S. Celso* at Milan; and in the frescoes with which he decorated the villa of the archduke Ferdinand in 1795. Napoleon I. appointed him court-painter. In return, he executed portraits of the French emperor and several of his generals. His most beautiful frescoes are the paintings on the ceilings of the palace of Milan, which consist of allegorical illustrations of Napoleon's career; and Apollo with the Muses in the Villa Bonaparte. Almost all the palaces in Italy contain frescoes by A. His finest oil-painting is Rinaldo in the garden of Armida. The fall of his patron, Napoleon I., left A. in indigence.

APPIANUS, *ăp'pĭ-ä'nŭs:* native of Alexandria, who lived

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during the reigns of Trajan, Hadrian, and Antoninus Pius. He was author of a Roman history, in 24 books, of which only 11 are extant. It was not remarkable for anything except the plan on which it was written. Instead of proceeding to exhibit chronologically the growth of the empire, from its rude beginning on the Palatine Hill to the period when its power held the whole world in awe, which is at once the popular and the philosophical method, he divided his work into ethnographic sections, recording separately the history of each nation up to the time of its conquest by the Romans. First in order were the books devoted to the old Italian tribes, and afterwards followed the history of Sicily, Spain, Hannibal's wars, Libya, Carthage, and Numidia, Macedonia, Greece Proper and its colonies, Syria, Parthia, the Mithridatic war, the civil wars, and the imperial wars in Illyria and Arabia. As a historian, A. is a mere compiler, and not very accurate in his compilation. His geographical knowledge is singularly deficient, considering, the age in which he lived; e.g., in his section on Spain, he states that it takes only half a day to sail from Spain to Britain. The edition of A. by Schweighaüser is highly esteemed, but the most complete is that in the *Bibliothèque Grecque* of Firmin Didot.

APPIAN WAY, *ăp'pĭ-ăn* [Lat. *Via Appia*]: well named by an ancient writer *Regina Viarum* (the queen of roads); formed, in part at least, by Appius Claudius Cæcus, while he was censor, B.C. 313. It is the oldest and most celebrated of all the Roman roads. It led from the *Porta Capena* at Rome in a southerly direction to Capua, passing through Three Taverns, Appii Forum, Terracina, etc. Subsequently, it was carried on to Beneventum, Tarentum, and thence to Brundusium. It had an admirable substructure or foundation, from which all the loose soil had been carefully removed. Above this were various strata cemented with lime; and, lastly, came the pavement, consisting of large hard hexagonal blocks of stone, composed principally of basaltic lava, and jointed together with great nicety, so as to appear one smooth mass. The remains of it are still visible, especially at Terracina. The cost must have been enormous, for the natural obstructions are great. Rocks had to be cut through, valleys filled up, ravines bridged, and swamps embanked.

AP'PIUS CLAU'DIUS CRAS'SUS: a Roman decemvir (in office, B.C. 451–449). While the other decemviri were engaged in repelling an incursion made by the Sabines, A. C. and his colleague Oppius remained in Rome, with two legions to maintain their authority. Meanwhile, A. C. had been smitten by the beauty of Virginia, daughter of a respected plebeian named Lucius Virginius, who was abroad with the army. By force and stratagem, representing that she was the born slave of Marcus Claudius, one of his clients, A. C. gained possession of the maid. His design was penetrated by Icilius, who was betrothed to Virginia, and who, aided by Numitorius, her uncle, threatened to raise an insurrection against the decemviri. Virginius, hurriedly

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recalled from the army by his friends, appeared and claimed his daughter; but, after another mock-trial, she was again adjudged to be the property of Marcus Claudius. To save his daughter from dishonor, the unhappy father seized a knife and slew her. The popular indignation excited by the case was headed by the senators Valerius and Horatius, who hated the decemvirate. The army returned to Rome with Virginius, who had carried the news to them, and the decemviri were deposed. A. C. died in prison by his own hand (as Livy states), or was strangled by order of the tribunes; his colleague, Oppius, committed suicide; and Marcus Claudius was banished. The *Claudia Gens* (see GENS) was one of the most numerous and important of the patrician tribes or clans of Rome; and besides the sons and grandsons of the decemvir, there were numerous persons of distinction who bore the name of Appius.

APPLANATE, a. *ăp'plăn-āt* [L. *ad*, to; *planātus*, made flat—from *plānus*, level, flat]: in *bot.*, flattened out; horizontally expanded.

APPLAUD, v. *ăp-plawd'* [L. *applaudĕrĕ*, to strike one thing upon another—from *ad*, for; *plaudo*, I make a noise by clapping the hands: F. *applaudir*]: to praise by clapping the hands or by some loud noise; to express approbation of; to commend. APPLAUD'ING, imp. APPLAUD'ED, pp. APPLAUD'ER, n. one who. APPLAUSE, n. *ăp-plawz'* [L. *ad*, *plausus*, having clapped the hands]: approbation by shouts or clapping of hands, or in some other noisy way; the act of praising. APPLAUSIVE, a. *ăp-plaw'zĭv*, that contains applause.—SYN. of 'applaud': to praise; commend; extol; approve; magnify;—of 'applause': acclamation; acclaim; commendation; plaudit; praise.

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APPLE', n. *ăp'pl* [AS. *aepl:* W. *apal:* Icel. *epli:* Dan. *äble*]: a well-known fruit of the tree *Pyrus mālus*, ord. *Rosăceæ*. APPLE OF THE EYE, the pupil. APPLE OF DISCORD, a subject of contention and envy. APPLES OF SODOM, the fruit of a plant growing near the Dead Sea, as described by Josephus; fruit fair to the eye, but dissolving into dust and ashes when plucked. See SOLANUM. LOVE-APPLE, the tomato.

APPLE: well-known fruit of the tree *Pyrus mālus*, ord. *Rosăceæ*. See PYRUS. The wild A., or CRAB-tree, very generally found in temperate climes of the n. hemisphere, a rather small and often somewhat stunted-looking tree, with austere, uneatable fruit, supposed to be the parent of the prized varieties of apple. The apple-tree, even in a cultivated state, is seldom more than 30–40 ft. high. It has a large, round head; the leaves are broadly ovate, much longer than the petioles, woolly beneath, acute, crenate, and provided with glands; its flowers are always produced 3–6 together, in sessile umbels, and are large, white, rose-colored externally, and fragrant. The fruit is roundish, or narrowest toward the apex, with a depression at each end. That of different varieties varies greatly in color and size. It is produced on spurs, which spring from branchlets of two or more years' growth, and continue to bear for a series of years. The fruit of the A. is, with regard to its structure, styled by botanists a *pome* (q.v.). The eatable part is what is botanically termed the *mesocarp* (see FRUIT), which, in its first development, enlarges with the calyx, the summit of the fruit being crowned at last by the dried 5-parted limb of the calyx; the *endocarp* being, when ripe, cartilaginous, and containing in its cells seeds which do not correspond with them in size, but are so free as often to rattle when it is shaken. The flavor is more or less aromatic, and ranges in different sorts from sweet to acid. The time of ripening varies from early summer to late autumn. Some kinds can be kept only a few weeks; others retain their flavor six or eight months.

The A. thrives best in the middle portion of the temperate zone. In high n. latitudes only a few varieties can be grown, and these of inferior quality. In warm regions the fruit is small and insipid. Some 4,000 varieties are cultivated, and the number is being rapidly increased. There are kinds suited to all climates in which the A. can be grown, to all tastes, and to all the different purposes (dessert, cooking, cider, etc.) for which the fruit is used. Many varieties have merely a local reputation; others are widely distributed. The quality of certain sorts is greatly modified by soil, climate, and cultivation. New varieties are obtained from seed, but not more than one in several thousand proves superior to kinds already grown. Propagation of varieties is principally by grafting (q.v.) and budding (q.v.) on stocks grown from seed (see NURSERY). Though sometimes dwarfed, the A. is usually grown as a standard (see ORCHARD). To secure trees sufficiently hardy to endure the climate of the colder regions of the United States, varieties have been imported from Russia, but they

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have not proved uniformly successful. The A. needs a good soil and careful attention. To promote the growth of the tree and the production of fruit, fertilizers containing liberal quantities of phosphoric acid, potash, and lime, should be supplied. If properly cultivated, good trees

Apple-blossom.

from the nursery shold bear a few specimens of fruit 3 years from planting, and in 10 years should yield paying crops, though some varieties are much slower than others in coming into bearing. The wood of the A. is hard, has a fine grain, and takes a handsome finish. The tree is hardy and vigorous, though the improved varieties are much less so than the natural sorts; and it lives 50 to 150 years. The Crab A. is often planted as an ornamental tree, and some of the Siberian varieties are vigorous growers, liberal bearers, and yield handsome fruit, of which many specimens are 1 to 2 in. in diameter. The fermented juice of the A. is called cider (q.v.); with age and exposure to the air it turns into vinegar (q.v.). That of the Crab A. is called verjuice. The A. is subject to various diseases, and is preyed upon by about 175 species of insects, which attack every part of the tree, and the fruit. For remedies for plant-lice, see APHIS; for various caterpillars and worms, spray with the Bordeaux mixture (q.v.) or a solution of Paris green (1 lb. to 200–300 gals. of water). For methods of preventing and destroying this pest, see BORER. The scab, a fungoid disease, affects the leaves and fruit; also the leaves are affected by various forms of blight and rust. Spraying with the Bordeaux mixture seems the most efficient remedy. A vigorous condition tends to prevent attacks of disease and insects. There is quite an export trade in apples, and immense quantities are required for home consumption. The census 1890 indicated that in the U. S. more than 240,000,000 A. trees were being grown for transplanting.

Beauflns or Biffins are apples slowly dried in

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ovens, and occasionally pressed till they become soft and flat. They are prepared in great quantities in Norfolk, Eng.

The SIBERIAN CRAB is perhaps the parent, by hybridization or otherwise, of some of the varieties of A. now in cultivation. Two species partake this designation, both natives of Siberia, and frequent in gardens in Britain. *Pyrus baccata* of Linnæus, and *Pyrus prunifolia* of Willdenow, which, however, scarcely differ, except that in the former the sepals (leaves of the calyx) are deciduous, in the latter they are persistent—a circumstance of very doubtful importance as a specific distinction. The fruit is sub-globose, yellowish, and rather austere, but is good for baking and for preserves.

The AMERICAN CRAB or SWEET-SCENTED CRAB (*P. coronaria*) is a native of N. America, especially of the s. part of the Alleghanies. It is a small tree with broad leaves and white flowers, becoming purple before they drop off, and which have a powerful smell, resembling that of violets. The fruit is flatly orbicular, of a deep green color, and sweet scented. It is very acid, but is made into cider, and also into preserves. *P. angustifolia*, a native of Carolina, much resembles this, but has much narrower leaves and smaller fruit.

The CHINESE CRAB (*P. spectabilis*) is a small tree, a native of China. It is very ornamental when in flower; the flowers being in sessile, many-flowered umbels, and of a bright rose-color. The fruit is irregularly round, about the size of a cherry, yellow, and fit to be eaten, like the medlar, only when in a state of incipient decay.

APPLEBERRY: see BILLARDIERA.

APPLEBY, *ăp'pl·be*, county town of Westmoreland, Eng.: lat. 54° 35′ n., long. 5° 28′ w. It is in the n. of the co., on the river Eden, which flows past Carlisle into the Solway Firth. A. has two parishes, one on each side of the river, which is here crossed by an old stone bridge of two arches. There is a castle in the town, the keep of which, called Cæsar's Tower, is still in moderately good condition. The lent and summer assizes are held at A. Until the passing of the Reform Bill, it returned two members to parliament. It was then disfranchised, though it still possesses a municipal corporation. Pop. (1891) 1,776.

APPLETON, *ăp'pl-tŏn*: town, cap. of Outagamie co., Wis., on the Grande Chute of the Fox river. The Grande Chute, from which the town sometimes takes its name, affords immense water-power; and at the same time a series of dams renders the stream navigable for steamboats through its whole course—a navigation which, with the aid of a canal between the Fox on the n., and the Wisconsin to the s., is carried all the way from Lake Michigan to the Mississippi. There is extensive manufacturing, and much enterprise. The place is the seat of Appleton College, and Lawrence University. Pop. (1880) 8,005; (1890) 11,825.

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APPLETON, DANIEL: publisher, founder of the house of D. Appleton and Co.: 1785, Dec. 10—1849, Mar. 27; b. Haverhill, Mass. After keeping a dry-goods store at Haverhill, he removed to Boston, and 1825 to New York. In the latter city, he placed his eldest son, William Henry A., in charge of a book department which he added to his dry-goods line, and which it soon superseded. For a time, the business was principally confined to the importation and sale of English works, and an agency was established in London 1835. The first publication was a 32mo book entitled *Daily Crumbs from the Master's Table*. William H. A. was taken into partnership 1838, and 10 years later the father retired. The business is conducted by a son and three grandsons of the founder and their publications have been largely in the higher lines of literature.

APPLETON, GEORGE SWETT: publisher: 1821, Aug. 11—1878, July 7; b. Andover, Mass.; son of Daniel A. After studying at Phillips Acad., in his native town, he spent four years at the Univ. of Leipzig. In 1865 he became a partner with three of his brothers in the firm of D. Appleton & Co. He developed a large trade in Spanish works, and introduced the department of illustrated books, of which the first venture was *Picturesque America*, then the finest illustrated work ever issued.

APPLETON, JESSE, D.D.: 1772, Nov. 17—1819, Nov. 12; b. New Ipswich, N. H.: educator. He graduated at Dartmouth College, taught for two years, studied theol., and became pastor of a Congl. church at Hampton, N. H., 1797. He was elected pres. of Bowdoin College 1807. He was an excellent classical scholar and an impressive preacher. A biographical sketch, with a collection of addresses, was published 1820, sermons and lectures 1822, and *The Works of Jesse Appleton, D.D.*, 2 vols., 1836.

APPLETON, NATHAN, LL.D.: 1779, Oct. 6—1861, July 14; b. New Ipswich, N. H.: merchant. He left college to enter the store of his brother, Samuel A., in Boston, with whom he soon formed a partnership. He was interested in the cotton factory at Waltham, in which power-looms were first used in this country; was one of the founders of the city of Lowell, a member of the state legislature for several terms, and was elected to congress 1830 and 42. He was a member of various learned societies, and very benevolent.

APPLETON, SAMUEL: 1766, June 22—1853, July 12; b. New Ipswich, N. H.: merchant. He worked on a farm, taught school, kept a store in his native town, removed to Boston 1794, and engaged in importing, and soon formed a partnership with his brother Nathan A. He also became interested in cotton manufacturing at Waltham and Lowell, and accumulated great wealth. He often distributed his entire annual income in charity.

APPLIABLE, APPLIANCE, etc.: see under APPLY.

APPLICATE, n. *ăp'plĭ-kāt* [L. *applĭcātus*, joined or at

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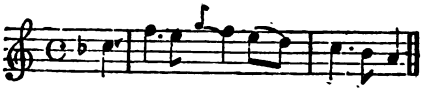
tached—from *ad*, to; *plĭco*, I fold]: in *geom.*, a straight line drawn across a curve so as to be bisected by the diameter; the ordinate.

APPLIQUE, a. *ăp-plēk'* [F.—from *appliquer*, to apply, to put on]: a style of work in which one material is laid upon another, as velvet on satin or cloth.

APPLY, v. *ăp-plī'* [OF. *applier*, to apply: L. *applĭcārĕ*, to fold upon—from L. *ad*, to; *plĭco*, I fold]: to lay on; to put one thing to another; to use or employ for a particular purpose; to fix the mind with attention; to make application; to suit; to keep at work. APPLY'ING, imp. APPLIED, pp. *ăp plīd'*: ADJ. said of a science whose laws have been reduced to rules for practical use, as *applied* chemistry, *applied* mathematics. APPLI'ER, n. one who. APPLIABLE, a. *ăp-plī'ă-bl*, that may be applied. APPLI'ABLY, ad. *blĭ*. APPLIANCE, n. *ăp-plī'ăns*, the act of applying; the thing applied; means to an end; resource. APPLICABLE, a. *ăp'-plĭ-kă-bl*, fit to be applied; suitable. AP'PLICABIL'ITY, n. *-kă-bĭl'ĭ-tĭ*, or AP'PLICABLENESS, n. *-bl-nĕs*, the quality of being applicable or fit to be applied. AP'PLICABLY, ad. *-blĭ*. APPLICANT, n. *ăp'plĭ-kănt*, one who applies; a petitioner. APPLICANCY, n. *ăp'plĭ-kăn-sĭ*, the state of being applicable. AP'PLICA'TION, n. *-kā'shŭn*, the act of applying; close study; great attention to, as to business; entreaty; employment of means. AP'PLICATIVE, a. *-kā-tĭv*, capable of being applied. AP'PLICATORY, a. *-kā-tĕr-ĭ*, capable of being applied: N. that which applies.

APPOGGIATURA, *ăp-pŏj'ă-tō'rŭ* [It.]: in *music*, a grace-note: a form of embellishment by insertion of notes of passage in a melody. The A. notes are printed in a smaller character than the leading notes of the melody, and should always be given with considerable expression. When they are extemporized by a performer or singer, they serve as an indication of good or of bad taste. The time of an A. is taken from the essential note to which it belongs, as in the following example:

Written.



Played.

For APPOGIA'TO, see PORTAMENTO.

APPOINT, v. *ăp-poynt'* [F. *appointer*, to refer a cause, to give wages; *appoincter*, to order, to finish a controversy—from L. *ad*, to; *punctum*, a point]: to find fitting; to settle the exact time for a transaction; to fix upon; to settle; to ordain; to furnish. APPOINT'ING, imp. APPOINT'ED, pp

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APPOINT'ER, n. one who. APPOINT'ABLE, a. *-ă-bl*, that may be appointed. APPOINT'MENT, n. state of being appointed; being named for an office; a situation or office; established order. APPOINT'MENTS, n. plu. the accoutrements of an officer. See EQUIPMENT: KIT: KNAPSACK. The appointments of a ship are, collectively, all her various articles of equipment and furniture. APPOINTEE, n. *ăp-poyn-tē'*, one appointed.—SYN. of 'appoint': to allot; nominate; prescribe; constitute; ordain; order;—of 'appointment': designation; command; order; direction; establishment; equipment.

APPOINTMENT, in Law: in England, conveyances granted on a consideration are frequently reserved in common law; and in family settlements, certain *powers*, as they are called, such as powers of jointuring, selling, charging land with the payment of money; and the subsequent exercise of the power is called an *A.* This A.—which may be made either by deed or by will—is not considered as an independent conveyance, but is merely ancillary to the deed or instrument in which the power of A. is reserved, and from which the party in whose favor the A. is made for most purposes derives his title. The Courts of Equity give relief against a defective A., or defective execution of a power, where there is what is called a 'meritorious consideration' in the person applying for such relief. As to what amounts to such meritorious consideration, Lord St. Leonards, in his work on Powers, lays down that Equity will relieve the following parties: 1. A purchaser, including in such term a mortgagee and lessee; 2. A creditor· 3. A wife; 4. A legitimate child; and 5. A charity.

In American chancery practice, A. is the exercise of a right to designate the person or persons who are to take the use of real estate. The A. must be made by the person authorized, who may be any person competent to dispose of an estate of his own in the same manner, including a married woman, even though her husband may be the appointee; or an infant, if the power be simply collateral. If the appointment be made 'to and amongst' several, a fair allotment must be made to each. The effect of an A. is to vest the estate in the appointee, as if conveyed by the original donor.

APPOMATTOX COURT-HOUSE, *ăp-pō-măt'toks:* small village, county-seat of Appomattox co., Va.; 80 m. w. of Richmond, about 20 m. e. of Lynchburg; 3 m. n. of Appomattox Station, on the Norfolk and Western r.r. It is famous for the surrender, by Gen. Robert E. Lee, of the Confederate army of n. Va. to Gen. Grant, 1865, April 9, practically ending the civil war.

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APPORTION, v. *ăp-pōr'shŭn* [F. *apportionner;* mid. L. *appor'tionāri*, to distribute equitably—from L. *ad*, to; *portiōnem*, a part]: to distribute in just portions; to give a share to; to divide; to assign. APPOR'TIONING, imp. APPOR'TIONED, pp. *shŭnd*. APPOR'TIONMENT, n. a dividing into shares or portions. APPOR'TIONER, n. one who.—SYN. of 'apportion': to allot; appoint; destine; divide; assign; share; distribute.

APPORTIONMENT, in Law: in the United States, the allowance made in the case of an incomplete performance of a contract; the allotment of their shares in a rent to the different parties indebted; and the determining, in the case of encumbered estates, of the amount which each of the several parties interested in the estate shall pay toward the removal, or in support of the burden of the incumbrance.

APPORTIONMENT BILLS, CONGRESSIONAL: acts of congress passed in accordance with the constitution, defining the number of representatives in congress allotted to each state—the number being assigned after each decennial census, in proportion to the total population. It is provided that the actual enumeration shall be made every ten years, that the number of representatives shall not exceed one for every 30,000, but that each state shall have at least one representative. From the organization of the govt. till 1830, the number of representatives had multiplied nearly three times; being 65 in 1789, and 240 in 1830. Till this time the allotment had increased from 1 member for every 30,000 pop. to 1 for every 47,700. In 1840 the relation was changed to 1 for every 70,680, each census increasing the ratio of divergence, until in 1890 it reached 1 for every 173,901 of pop., there being then 356 members. The rule generally followed has been based on an intention to have no more than 300 members, and the difference between this number and the actual figures has been caused mainly by accession of new states. The latest act of apportionment was approved 1891, Feb. 7, increasing the number of members by 31, the same to take effect 1893, Mar. 4. By the redistricting in the several states the increase of representation was as follows: Ala. 1, Ark. 1, Cal. 1, Colo. 1, Ga. 1, Ill. 2, Kan. 1, Mass. 1, Mich. 1, Minn. 2, Mo. 1, Neb. 3, N. J. 1, Or. 1, Penn. 2, Tex. 2, Wis. 1. In addition, the increase by admission of new states since the previous apportionment of 1893, was: Ida. 1, Mont. 1, N. D. 1, S. D. 2, Wash. 2, Wyo. 1. The principle applied in the case of the U. S. house of representatives is adopted in the several states in their apportionment for representation in their legislative bodies, and such apportionment usually follows the decennial period. See CONGRESS, UNITED STATES.

APPOSITE, a. *ăp'pō-zĭt* [L. *appŏsĭtus*, put or placed at or near—from *ad*, to; *posĭtus*, placed or put]: well put in respect of time, place, or circumstances; suitable; well adapted to: in *bot.*, having similar parts; similarly placed;

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placed, as side by side. AP'POSITELY, ad. *-zĭt-lĭ.* AP'-POSITENESS, n. fitness; suitableness. APPOSITION, n. *ăp'-pō-zĭsh'ŭn,* the act of placing beside; in *gram.,* two nouns following each other in the same case, the latter explanatory of the former, or modifying it in some way.

APPOSI'TION: a term in Grammar signifying the annexing of one substantive to another, in the same case or relation, in order to explain or limit the first, as *My brother, the physician; Thomas the Rhymer.* Whole sentences or clauses admit of A.; thus, 'Napoleon sought the way to India through Russia, a stroke of genius.' Sometimes a connecting word is used where logical propriety would require A.; as, *the city of London,* for *the city London.*

APPRAISE, v. *ăp-prāz'* [F. *apprécier,* to value; mid. L. *appretĭārĕ,* to put a price upon—from L *ad,* to; *prĕtĭum,* a price]: to put a price upon; to fix the value of an article for the purpose of sale. APPRAIS'ING, imp. APPRAISED', pp. *-prāzd'.* APPRAIS'ER, n. one whose business it is to put values on articles that are to be sold. APPRAISEMENT, n. *ăp-prāz'mĕnt,* a valuation put on an article.—SYN. of 'appraise': to appreciate; estimate; esteem; value.

APPRAISEMENT: the valuation of goods or real estate by persons appointed by competent authority and called appraisers. Such valuation is ordered by law or by the courts, in the case of property of persons dying intestate, of insolvents and of others. Where private property is taken for public use, an A. is made of it, that the owner may be paid its just value. A. is also often a matter of agreement in the private settlement of disputed questions, in purchase and sale, and in forming co-partnerships, or in making contracts for service, where property, real or personal, is a factor. In collecting the customs at ports of entry, the appraiser and his deputies are officials charged with examining goods imported and dutiable, with a view to prevent under-valuation and to prescribe the proper classification for charging the legal duty.

APPRECIATE, v. *ăp-prē'shĭ-āt* [mid. L. *appre'tĭārī,* to value at a price—from L. *ad, pre'tĭum,* a price: F. *apprécier:* see APPRAISE, from same root-words]: to set a proper value on; to esteem rightly; in *Amer.,* to rise in value; to raise the value of. APPRE'CIATING, imp. APPRE'CIATED, pp. APPRECIABLE, a. *ăp-prē'shĭ-ă-bl,* that may be properly valued; capable of being estimated. APPRE'CIABLY, ad. *-blĭ.* APPRECIATION, n. *ăp-prē'shĭ-ā'shŭn,* the setting a value on; a just estimate of.—SYN. of 'appreciate': to appraise; estimate; esteem; value.

APPREHEND, v. *ăp-prĕ-hĕnd'* [F. *appréhender*—from L. *apprĕhend'ĕrĕ,* to seize or take hold of—from L. *ad,* to; *prehendo,* I seize or take]: to take hold of; to seize; to understand; to think on with fear. AP'PREHEN'DING, imp. AP'PREHEN'DED, pp. AP'PREHEN'DER, n. one who. AP'-PREHEN'SIBLE, a. *-sĭ-bl* [L. *apprĕhensus,* seized or taken hold of]: that may be apprehended. AP'PREHEN'SION, n. *-hĕn'shŭn,* the act of taking or seizing; the being able to understand; suspicion; fear. AP'PREHEN'SIVE, a. *-sĭv,*

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fearful; in expectation of evil. AP'PREHEN'SIVELY, ad. *-sĭv-lĭ.* AP'PREHEN'SIVENESS, n. the quality or state of being apprehensive.—SYN. of 'apprehend': to conceive; suppose; imagine; presume; assume; fear; dread; catch; arrest; detain; capture; understand; believe. See ARREST.

APPRENTICE, n. *ăp-prĕn'tĭs* [OF. *apprentis;* F. *apprenti,* a beginner—from *apprendre,* to learn: mid. L. *apprentic'ĭŭs,* an apprentice—from L. *ad,* to; *prehendo,* I take]: one taken under a bond or indenture as a beginner or learner; a young person learning a trade or profession: V. to put under a master to learn a trade or profession. APPREN'TICING, imp. APPREN'TICED, pp. *-tĭst.* APPREN'TICESHIP, n. the service or condition of an apprentice.

APPRENTICE: one taken under bond or indenture as a beginner or learner. Apprenticeship exists at common law, but, in the United States, has been generally regulated by statute, on account of its liability to abuse. It is not binding upon an infant unless the contract be entered into by him with the consent of the parent or guardian, or by the parent or guardian with his consent, such consent to be made a part of the contract. In a common indenture of apprenticeship the father is bound for the performance of the covenants by the son. This contract must be entered into, generally, by indenture or deed, and is to continue, if the A. be a male, only during minority, and if a female, only till she arrives at the age of eighteen. The law holds that the agreement entered into is binding upon the master equally with the A.; the former stands *in loco parentis* to the latter; that he is bound to treat the A. with kindness, and not ill-use him in any way, must watch over his general conduct and afford him a good example and good advice, and must so instruct him in his trade or vocation that, if he be diligent and capable, he can thoroughly learn it—although the master is not to be held accountable for failure because of incompetency. He cannot dismiss his A. without the consent of all the parties to the indenture, even though the A. should steal his master's property, or by reason of incurable illness become incapable of service, except by the sanction of some competent tribunal. Upon the death of the master, the apprenticeship is dissolved.

APPRESSED, a. *ăp-prĕst'* [L. *ap,* for *ad,* at or to; *pressus,* pressed, kept under]: in *bot.,* denoting leaves which are applied to each other, face to face, without being folded or rolled together.

APPRISE, v. *ăp-prīz'* [F. *appris,* learned, instructed—from L. *ad,* to; *prehendo,* I seize or take]: to instruct in the knowledge of a thing; to inform; to give notice of. APPRI'SING, imp. APPRISED', pp. *-prīzd'.* For APPRISING, an obsolete term in Scotch law, see ADJUDICATION.

APPROACH, v. *ăp-prōch'* [F. *approcher,* to draw near—from mid. L. *appröprĭāre,* to approach—from L. *ad,* to; *prope,* near; *propriŭs,* nearer]: to draw near; to come up to: N. a coming or drawing near; a path or avenue. APPROACH'ES, n. plu. *-ĕz,* siege-works; means of access. APPROACH'ING, imp. APPROACHED, pp. *ăp-prōcht'.* AP-

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PROACH'ER, n. one who. APPROACH'ABLE, a. *-ă-bl*, that may be reached; accessible. APPROACH'MENT, n. the act of coming near. APPROACH'LESS, a. that cannot be come near to or approached.—SYN. of 'approach': access; admittance; approximation.

APPROACH'ES: in military language, the sunken trenches or excavated roads constructed by besiegers. The siege camp being usually at a considerable distance from the fortress or city attacked, the soldiers would be exposed to imminent danger while hastening across a belt of open country to enter any breaches made by the large siege guns, were it not that concealed roads are first constructed along which they may approach. In some cases the A. are not actual trenches, but merely paths shielded by a piled-up wall of sand-bags, fascines, gabions, woolpacks, or cotton-bales. One of the most tremendous combinations of A. in the history of war was at the siege of Sebastopol in 1854–55; it comprised the digging of no less than 70 m. of sunken trench, and the employment of 60,000 fascines, 80,000 gabions, and 1,000,000 sand-bags, to protect the men working in the trenches and at batteries. See SAP: SIEGE.

AP'PROBATE AND REP'ROBATE: technical expression in the law of Scotland, which simply means, that no one can be permitted to A. and R.—that is, to accept and reject the same deed or instrument. It is applicable to wills, and other legal writings, deeds, or instruments; and is analagous to election (q.v.).

APPROBATION, n. etc.: see under APPROVE.

APPROPRIATE, v. *ăp·prō'prĭ-āt* [L. *appro'priātus*, made proper or peculiar to one's self—from *ad*, to; *proprĭus*, private, one's own: F. *approprier*, to appropriate]: to apply to one's own use; to set apart for a particular use; to claim or use as by right: ADJ. limited or set apart to a particular person or use; fit; suitable. APPRO'PRIATING, imp. APPRO'PRIATED, pp. APPRO'PRIATENESS, n. peculiar fitness; suitableness. APPRO'PRIATELY, ad. *-lĭ*. APPRO'PRIA'TION, n. *-shŭn*, the act of setting apart for a particular use or purpose; the setting aside of a benefice for the use of some spiritual foundation, as for a college or chapter. APPRO'PRIA'TOR, n. one who holds an appropriated benefice. APPRO'PRIABLE, a. *-ā-bl*, that may be appropriated or set apart. APPRO'PRIATIVE, a. *-prĭ-ā-tĭv*, that appropriates.—SYN. of 'appropriate, v.': to usurp; arrogate; assume; ascribe; claim; exercise; annex;—of 'appropriate, a.': peculiar; particular; suitable.

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APPROVE, v. *ăp-prōv'* [F. *approuver*, to approve—from L. *approbārĕ*, to favor—from L. *ad*, to; *probo*, I prove or test; *prōbus*, good]: to be pleased with as good; to pronounce sufficient; to like; to commend. APPRO'VING, imp. APPROVED', pp. *-prōvd'*. APPRO'VINGLY, ad. *-lĭ*. APPRO'VER, n. one who approves; a criminal who gives evidence against his accomplices; one who makes trial. APPROVE'MENT, n. approbation; evidence of an approver. APPROBATION, n. *ăp'prō-bā'shŭn*, the act of approving; commendation; expression of approval or satisfaction with. APPROBATIVE, a. *ăp'prō-bā'tĭv*, or APPROBATORY, a. *ăp'-prō-bā'tĕr-ĭ*, containing or implying approbation. AP'PROBA'TIVELY, ad. *-lĭ*. AP'PROBA'TIVENESS, n. in *phren.*, the love of approbation. APPROVABLE, a. *ăp-prō'vā-bl*, that merits approval. APPRO'VABLENESS, n. APPROVAL, n. *ăp-prō'văl*, approbation.—SYN. of 'approbation': approval; concurrence; consent; liking; sanction; proof;—of 'approve': to praise; applaud; commend; extol; confirm.

APPROVER, or PROVER, in the Law of England: an accomplice in the perpetration of a crime who has been admitted to give evidence against the prisoner.

In the United States the term A. is not known in law: the legal designation is ACCOMPLICE; and accomplices are admitted to give evidence for the prosecution, or, as it is said, to become *state's evidence*, upon an implied promise of pardon, on condition of their making a full and fair confession of the whole truth. The testimony of an accomplice is in all cases, however, regarded with just suspicion; and, unless his statement is corroborated in some material part by unimpeachable evidence, the jury are usually advised by the judge to acquit the prisoner; and if the accomplice, after having confessed the crime, and being admitted as state's evidence, does not satisfy the condition on which he was so received by failing to give full information without equivocation, reservation, or fraud, he then forfeits all claim to protection, and may be tried, convicted, and punished on his own confession.

APPROXIMATE, v. *ăp-prŏks'ĭ-māt* [L. *approx'ĭmātus*, brought near—from *ad*, to; *prox'ĭmus*, next, nearest]: to come near; to approach; to cause to approach. ADJ. nearest to or next; nearly approaching accuracy. APPROX'IMA'TING, imp. APPROX'IMA'TED, pp. APPROX'IMA'TION, n. *-shŭn*, a near approach; an advancing near; a continual approach nearer and nearer to a result. APPROX'IMATELY, ad. *-lĭ*, with a near approximation. APPROX'IMA'TIVE, a. *-tĭv*, that approaches closely.

APPROXIMA'TION: term in mathematical science designating such calculations as are not rigorously correct, but approach the truth near enough for a given purpose. Thus in logarithmic and trigonometrical tables nearly all the numbers are mere approximations to the truth. The calculations of astronomy generally are of this nature. Even in pure mathematics there are parts in which approaches to the truth, by means of interminable series, are all we are able

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to gain. The solution of equations beyond the fourth degree can be got only by A.

APPUI, *ăp-pwē* [Fr.]: a stay or support. In military tactics, the *points d'appui* are such parts of the field of battle as are suited to give support or shelter. As the wings of an army (like the extreme sides of a chess-board) are the weakest points of resistance to attack, they especially require support or protection, and are placed, when it is possible, in localities which serve to obstruct the attacking forces. Lakes, morasses, woods, streams, and steep declivities may thus serve as *points d'appui*.

APPULEIUS, or, less properly, APULEIUS, *ăp-pū-lē'yŭs:* satirical writer of the 2d c.; b. Madaura, in Africa, where his father was a magistrate, and a man of large fortune. A. studied first at Carthage, which at that time had high reputation as a school of literature. Afterwards he went to Athens, where he entered keenly upon the study of philosophy, displaying a special predilection for the Platonic school. The fortune bequeathed to him at his father's death enabled A. to travel extensively. He visited Italy, Asia, etc., and was initiated into numerous religious mysteries. The knowledge which he thus acquired of the priestly fraternities, he made abundant use of afterwards in his *Golden Ass*. His first appearance in literature arose from a lawsuit. Having married a middle-aged lady, named Pudentilla, very wealthy, but not beautiful, he drew upon himself the malice of her relations, who desired to inherit her riches, and who accused the youth of having employed magic to gain her affections. His defense (*Apologia*, still extant), spoken before Claudius Maximus, proconsul of Africa, was an eloquent and successful vindication of his conduct. After this he seems to have given zealous attention to literature and public oratory, in both of which he attained great eminence. He was so extremely popular that the senate of Carthage, and other states, erected statues in his honor.

The *Golden Ass*, the work by which his reputation has survived, is a romance or novel, whose principal personage is one *Lucian*, supposed by some, though on insufficient evidence, to be the author himself. It is generally understood to have been intended as a satire on the vices of the age, especially those of the priesthood, and of quacks or jugglers affecting supernatural powers, though Bishop Warburton, and other critics, fancy they can detect in it an indirect apology for paganism. Its merits are both great and conspicuous, as are also its faults. Wit, humor, satire, fancy, learning and even poetic eloquence abound, but the style is disfigured by excessive archaisms, and there is a frequent affectation in the metaphors, etc., which proves A. to have been somewhat artificial in his rhetoric. The most exquisite thing in the whole work is the episode of Cupid and Psyche (imitated by La Fontaine). It is supposed to be an allegory of the progress of the soul to perfection. Besides the *Apologia* and *Golden Ass*, we have from the pen of A. an Anthology in four books, a work on the Dæmon of

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Socrates, one on the doctrines of Plato, one on *The Universe*, etc. A considerable number of his works are lost. The most recent and careful edition of the whole works of A. is that pub. Leipsic, 1842, by G. F. Hildebrand. The *Golden Ass* was translated into English by T. Taylor (1822), and again by Sir G. Head (1851). An English version of the works of A. was pub. London, 1853.

APPULSE, n. *ăp-pŭls'* [L. *appul'sus*, driven to or towards—from *ad*, to, at; *pulsus*, pushed, struck]: the act of striking against; in *astron.*, near approach of two heavenly bodies to one another; also APPUL'SION, n. *-shŭn*. APPUL'SIVE, a. *-sĭv*, striking against. APPUL'SIVELY, ad. *-sĭv-lĭ*.

APPURTENANCE, n. *ăp-pĕr'tĕ-nănse* [OF. *apurtenaunce;* F. *appartenance*, an appendage: mid. L. *apparte-nĕn'tĭă*, anything protected as one's own—from L. *ad*, to; *pertin'ĕō*, I pertain or belong]: that which belongs to something else; an adjunct; an appendage. APPUR'TENANT, a. joined to, or belonging to. See APPERTAIN.

APRAXIN, *â-prâk'sin*, FEODOR MATVAYEVICH, Count of: 1671–1728, Nov. 10: distinguished Russian admiral. When hardly twelve years of age, he entered the service of Peter the Great, who formed a great attachment for him, which lasted during the whole life of the monarch. In 1699, he took part in the first maneuvers of the Russian fleet at Taganrog on the Sea of Azof. After 1700 he became the most powerful person at the court of the czar, who made him chief-admiral of the Russian navy, of which, in fact, A. may be considered the creator. While Peter was fighting the Swedes in the n., A. was building war-vessels, fortresses, and wharfs in the s. In 1707, he was appointed pres. of the admiralty; in 1708, he defeated the Swedish general, Lübecker, in Ingermannland, and saved the newly-built city of Petersburg from destruction; in 1710, he captured the important town of Viborg, in Finland; and in 1711, commanded in the Black Sea during the Turkish war. The following year he returned to the n.; and in 1713, with a fleet of 200 vessels, he sailed along the coast of Finland, took Helsingfors and Borgo, and defeated the Swedish fleet. The result of his great successes was, that at the peace of Nystadt, 1721, Russia obtained some most valuable advantages, being confirmed in her possession of Finland, just conquered, and of Esthonia. In spite of his brilliant reputation, however, he twice suffered an apparent eclipse of imperial favor. In 1714–15, he was charged with embezzlement, tried, and condemned to pay a fine; and a few years later was denounced by Peter himself as 'an oppressor of the people,' and again condemned to pay a fine; but his services were too useful to be dispensed with, and in both instances the czar neutralized the effect of the condemnation, by conferring upon him additional riches and dignities. In 1722, he accompanied Peter in his Persian war, and was present at the siege of Derbend. His last naval expedition was in 1726, when he repaired with the Russian fleet to Revel, to defend that place against an expected attack by

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the English. He d'ed at Moscow, in the 57th year of his age.

APRICOT, n. *ā'prĭ-kŏt* [Sp. *albaricoque*—from Ar. *albirkouk:* Pers. *barkuk*, a peach, of which L. *præcoc'ĭă*, Gr. *praikŏk'ĭă*, seems to be a mere adaptation: F. *abricot*]: old spelling APRICOCK: (*Prunus Armeniaca*): a species of the same genus with the PLUM (q.v.): native of Armenia, and of the countries eastward to China and Japan; a middle-sized tree of 15–20, or even 30 ft. high, with ovate, acuminate, and cordate, smooth, doubly-toothed leaves on long-stalks; solitary, sessile, white flowers which appear before the leaves, and fruit resembling the peach, roundish, downy, yellow, and ruddy on the side next the sun, with yellow flesh. The A. was brought into Europe in the time of Alexander the Great, and since the days of the Romans has been diffused over all its western countries. It has been cultivated in England since the middle of the 16th c. The A. is nearly as hardy as the ordinary varieties of the peach, but in order to prevent a too early starting of the buds in spring, the tree should have a n. rather than a s. exposure. The soil should be deep and rather dry; if overlying an impervious subsoil it should be underdrained. Varieties are propagated usually by budding (q.v.), though in the nursery, grafting (q.v.) is sometimes done. In warm climates A. and peach stocks are often used, but plum stocks are preferred for cold regions. The A. ripens several weeks earlier than the peach. It is particularly subject to attacks of the curculio (q.v.). There are about 20 good varieties. Apricots split up, having the stone taken out, and dried, are brought from Italy as an article of commerce, in particular from Trieste, Genoa, and Leghorn: in the s. of France, also, they are an article of export in a preserved and candied state. Dried apricots from Bokhara are sold in the towns of Russia, the kernels of which are perfectly sweet like those of the sweet almond. The kernels are sweet in some kinds, and bitter in others—the bitterness being probably more natural, and the sweetness, as in the almond, the result of cultivation. Generally speaking, the kernels may be used for the same purposes as almonds. From the bitter kernels, which contain prussic acid, the *Eau de noyaux* is distilled in France. The charred stones yield a black pigment similar to Indian ink. The wood of the tree is good only for the purposes of the turner.

The BRIANÇON A. (*Prunus Brigantiaca*), very much resembles the common A. The fruit is glabrous. It is found in Dauphiné and Piedmont. At Briançon, an oil, called *Huile de marmotte*, is expressed from the seeds.

The SIBERIAN A. (*P. Sibirica*), also is very like the common A., but smaller in all its parts. The fruit is small. It is a native of Siberia, especially of the s. slopes of the mountains of Dahuria.

The A. PLUM is an excellent kind of plum, much cultivated in some parts of France, and which, preserved in sugar, dried, and packed in shallow boxes, forms a considerable article of trade.

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APRIL, n. *ā'prĭl* [L. *aprĭlis*—from *aper'ĭŏ*, I open: F. *avril:* Sp. *abril:* It. *aprile*]: the fourth month of the year. The Romans named the month thus because it was the season when the buds began to open: by the Anglo-Saxons it was called Ooster or Easter-month; and by the Dutch Grass-month. APRIL-FOOL, one deceived in some humorous and ludicrous way on the 1st of April, as being sent on an absurd errand. The custom is perhaps a travesty of the sending hither and thither of the Saviour from Annas to Caiaphas, and from Pilate to Herod, because during the middle ages this scene in Christ's life was made the subject of a miracle-play (q.v.) at Easter, which occurs in the month of A. It is possible, however, that it may be a relic of some old heathen festival. The custom, whatever its origin, appears to be universal throughout Europe. In France, one thus imposed upon is called *un poisson d'Avril* (an A. fish). In England, such a person is called an A. fool; in Scotland, a gowk. Gowk is the Scotch for the cuckoo, and also signifies a foolish person. The favorite jest in Britain is to send some one upon an errand for something grossly nonsensical—as for pigeon's milk, or the history of Adam's Grandfather; or to make appointments which are not to be kept; or to call to a passer-by that his latchet is unloosed, or that there is a spot of mud upon his face. It is curious that the Hindus practice precisely similar tricks on the 31st of March, when they hold what is called the Huli Festival.

A PRIORI, a. *ā'prī-ōr'ī* [L. *a*, from; *prior*, former]: at first sight; prior to investigation; applied to reasoning which rests on general notions or ideas, and is independent of experience; the correlative of A POSTERIORI, the one implying the *cause*, the other the *effect*. The argument *a priori* is a mode of reasoning by which we proceed from the antecedent *cause* to the consequent *effect*, or from anticipation rather than from experience: mathematical proofs are examples of *a priori* reasoning. The argument *a posteriori* is the opposite, and reasons from the *effect* to the *cause*, from the individual case to the law, or generally from experience and not from anticipation. A predilection for one or the other of these forms of reasoning forms one of the most important distinctions among schools of philosophy. Plato may be taken as typical of the A-P. school, Locke and Bacon of the other. A-P. philosophy claims for its conclusions the character of necessary truths, and denies that there can be *a posteriori* proof of anything, that kind of reasoning furnishing only a confirmation or verification. The opposite school maintain that the general notions or principles on which A-P. reasoning rests are themselves the results of experience, and that, therefore, all truth rests really on *a posteriori* grounds.

APRON, n. *a'pŭrn*, or *ā'prŏn* [OF. *naperon*, a large cloth: F. *nappe*, table-cloth—from L. *mappa*, a table-napkin]: a made-up piece of cloth or leather worn in front; a covering, as of lead or zinc. A. of a cannon, a piece of sheet-lead which covers the touch-hole, tied by two pieces of white rope. A. in ship-building, a piece of curved timber fixed behind the

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lower part of the stem, and just above the foremost end of the keel; its chief use is to fortify the stem, and connect it more firmly with the keel. The name A. is given also to the plank-flooring raised at the entrance of a dock, a little higher than the bottom, to form an abutment against which the gates may shut. APRONED, a. *ā'prŭnd*, wearing an apron. A'PRON-MAN, n. a man who wears an apron; a workman.

APROPOS, ad. *ăp'rō-pō'* [F. *à propos*]. to the purpose; seasonably.

APSE, n. *ăps*, or APSIS (q.v.) *ăp'sĭs;* APSIDES, n. plu. *ăp'sĭ-dēz*: semicircular recess at the east end of the choir, or chancel, in Romanesque or what are often called Anglo-Saxon or Anglo-Norman churches; a dome-roofed recess in a building; the arched roof of a room. The curious origin of this peculiar termination to the choir of a church has been clearly established by recent German writers. It is well known that the heathen structure from which the early Christians borrowed the form of their churches was not the temple, but the basilica or public hall which served at once for a market-place and a court of justice. The basilica, for the most part, was a parallelogram, at one of the shorter sides of which, opposite to the entrance, there was a raised platform destined for the accommodation of persons engaged in and connected with the distribution of justice. This portion of the building was the prototype of the rounded choir, to which the name of A. was given, and which is still to be

Church at Schwartz, Rheindorf.

seen in many of the Rhenish churches. For the pretor's chair, which was placed in the centre of this semicircular

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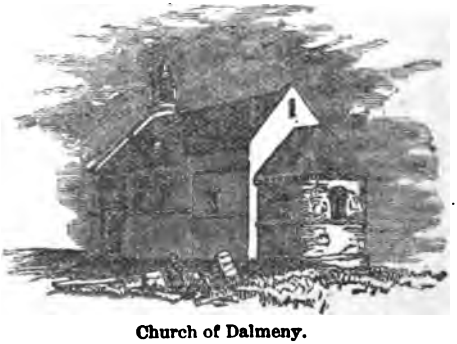
space, the altar was substituted; and the steps which led to the seat from which he dispensed justice were destined henceforth to lead to the spot where the Fountain of all justice should be worshipped. Many A.'s are to be met with in English churches, an enumeration of which will be found in Parker's *Glossary of Architecture*. On the continent the structure is much more frequent, and continued to be used to a much later period, indeed is still to be seen in almost every village along the Rhine. The lower part of the A. is there usually pierced by two or three round arched windows, often of irregular size and height, over which there is invariably an external gallery supported by pillars, in the form of which the rude idea of a Roman pillar is at once apparent; and the whole is joined to the end of the nave, which rises considerably above it, by a roof in the form of a segment of a cone. In larger churches there is a complete row of windows of the same rounded form, divided by pillars similar to those by which the gallery is supported, and under them frequently a line of arches of corresponding construction, while one or two small and irregular holes of the same form give a scanty light to the crypt beneath. Many of the smaller churches have no aisles; and the semicircular A. forms the termination of, or rather contains, the chancel. The more complete specimens of the style, however, such as the minster at Bonn, afford—with the exception of the transepts and the towers, which are later additions—about the most perfect examples to be found on this side of the Alps of the form of the Roman basilica, at first adapted to Christian uses. Several examples of the A. are to be seen



Church of Dalmeny.

in ecclesiastical structures in the United States, and the feature has been introduced with fine effect in library buildings, etc.

APSIS, n. *ăp'sĭs*, or APSE, n. *ăps*, APSIDES, n. plu. *ăp'sĭdēz* [Gr. *hapsis*, a junction]: one of the two extreme points in the orbit of a planet—the one at the greatest, the other at the least distance from the sun. The term A. is also applied in the same manner to the two points in the orbit of a satellite—one nearest to, the other furthest from, its primary; corresponding, in the case of the moon, to the perigee and

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apogee. A right line connecting these extreme points is called the line of A. In all the planetary orbits, this line has no fixed position in space, but makes a forward motion in the plane of the orbit, except in the case of the planet Venus, where the motion is retrograding. This fact in the orbit of the earth gives rise to the anomalistic year (q.v.). This advancing motion of the line of A. is especially remarkable in the orbit of the moon, where it amounts to 40° 40′ 32″·2 annually, an entire revolution thus taking place in rather less than nine years.

APT, a. *ăpt* [F. *apte*—from L. *aptus*]: ready; quick; fit; suitable. APT'LY, ad. *-lĭ*. APT'NESS, n. readiness or quickness in learning; fitness. APTITUDE, n. *ăp'tĭ-tūd* [mid. L. *aptĭtūdo*, fit time, fitness]: a disposition for; readiness; docility.—SYN. of 'apt': ready; prompt; clever; fit; meet; suitable; quick; liable; disposed; qualified; inclined.

APTEROUS, a. *ăp'tĕr-ŭs* [Gr. *a*, without; *ptĕron*, a wing]: without wings. APTERA, n. *ăp'tĕr-ă*, a division of insects in which the adult is destitute of wings, as in the lice. In the Linnæan system, the *Aptera* form an order of insects; but more important distinctive characters being found to belong to the insects included in it, it is no longer retained as an order or principal division in the best entomological systems.

APTERYX, n. *ăp'tĕr-ĭks:* a genus of cursorial birds peculiar to New Zealand, which form a family of the group to which the ostrich-like birds belong, as also the extinct moas and æpyornis. The beak is long and slender; the legs and thighs strong; the claws of the three anterior toes are used as weapons of offense. The wings are merely rudimentary, and concealed by the loose, almost hair-like plumage. The feathers of the dorsal plumage are lanceolate, and composed externally of long, disunited filaments, the downy portion towards the root much developed. The wings have not the accessory plumage so highly developed in some of the struthious birds. The skin is very tough.

Apteryx Australis.

Four species have been described; the largest (*Apteryx haasti*) stands about 3 ft. high; the smallest (*A. Mantelli*) is about 23 in. from tip of beak to toe. The other two species are

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A. Australis (of which perhaps *A. Mantell'i* is only a variety) and *A. Oweni*. Worms are the A.'s chief food, in search of which it deftly insinuates its flexible beak into the soft earth. The A. also eats insects, grubs, and some berries. It is nocturnal in its habits, and its nest is at the base of a hollow tree, or in deep holes in the ground. The native name is *kiwi-kiwi*.

APTITUDE, APTLY, APTNESS, etc.: see under APT.

APTOTE, n. *ăp'tōt* [Gr. *a*, without; *ptōtos*, that can, or is wont to fall]: an indeclinable noun.

APULIA, *ā-pū'lĭ-a:* part of ancient Iapygia (so named after Iapyx, son of Dædalus); now includes the s.e. part of Italy as far as the promontory of Leuca, and also the extreme peninsula of Calabria. Here, in ancient times, lived three distinct peoples—the Messapians or Salentini, the Peuceni, and the Dauni or Apulians. According to old Latin traditions, Daunus, king of the Apulians, when banished from Illyria, settled in these parts of Italy. Later traditions say that Diomedes, the Ætolian, with several other heroes returning from the Trojan war, came to Italy, and, in his war with the Messapians, was assisted by Daunus, but was afterwards deprived of his territory, and put to death. Roman poetry has preserved these old names; but in history, no mention is made of any king of A., though we find the names of its principal cities—Arpi, Luceria, and Canusium. The second Punic war was for some time carried on in A. In the present day, A. (now styled PUGLIA) is merely the name of a compartment, which has no political meaning, and which includes the three provinces of Capitanata or Foggia, Bari, and Terra di Otranto or Lecce. It is but a shadow of its former self, in the time of the Greek colonies, under Roman dominion, or even under the Normans, who took possession of it, 1043. The towns are depopulated, industry has disappeared, and commerce, once flourishing, has passed away. Agriculture is in a very low condition, and the few roads are infested by banditti. See Gregorovius' *Apulische Landschaften* (2d ed., Leips. 1880).

APURA, *ā-pō'rā:* navigable river of Venezuela, which rises near the w. boundary among the e. Cordillera, and flows nearly 1,000 m. eastward, past the towns of Nutrias and San Fernando, till it falls into the Orinoco, in lat. 7° 40′ n. and long. 66° 45′ w.

APURIMAC, *ā-pō-rē-mâk':* river of Peru, which, after a course of 500 m., assumes the name, first, of Tambo, and then of Ucayali (q.v.), which finally joins the Tangaragua to form the Amazon. The A. proper rises to the n.w. of the great table-land of Lake Titicaca, receiving from it, however, no portion of its waters. Among the tributaries of the Amazon, it is one of the most southerly; while among them, it approaches perhaps the nearest to the Pacific. The A., from its source in lat. 16° s., drains the e. face of the Andes through about 5°, till it changes its name, as above, in 10° 45′ s., meanwhile receiving several considerable affluents, especially the Villcamayo, from the opposite

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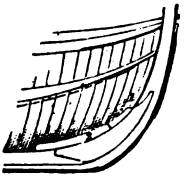
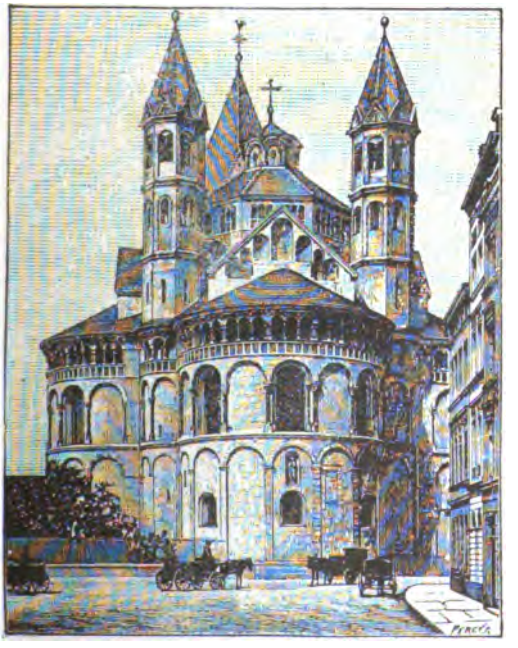
Apricot (*Prunus armeniaca*).



1, **Apron**; 2, Lower Apron.



Apse.—The Church of the Apostles, Cologne. (From a Photograph.)

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quarter. The A. and its feeders partake of the nature rather of mountain torrents than of navigable rivers; and even for travelling by land, their rocky and rugged banks are always difficult, and often impracticable. The valleys vary in climate and productiveness according to their elevation. The upper ones yield wheat and barley, and most of the fruits of Europe; while the lower, or at least the lowest ones, abound in sugar and cotton, plantains and pine-apples. The basin of the A., as a whole, is said to be the finest part of Peru, and to contain the largest proportion of native population—the best specimens apparently of the aboriginal civilization.

APUS, n. *ā'pŭs* [Gr. *a*, without; *pous*, a foot]: a genus of the *phyllop'ŏda*, having 60 pairs of apparent feet, all but two foliaceous or leaf-like, often found in great numbers in pools and ditches; a bird so called because it did not use its feet; a martinet or martin, a bird with very small feet; in *astron.*, a constellation near the s. pole.

APYRENUS, n. *ā'pĭ-rē'nŭs* [Gr. *a*, without; *pŭrēn*, a seed]: in *bot.*, fruit which produces no seeds, as cultivated varieties of the orange, pine apple, etc.

APYREXY, n. *ā'pĭr-ĕk'sĭ* [Gr. *a*, *pŭres'so*, I have fever —from *pur*, fire]: the intermission of a fever. APYROUS, a. *ā'pĭr-ŭs*, fire-proof; incombustible; that sustains a strong heat without alteration. APYRETIC, a. *ā'pĭr-ĕt'ĭk*, without fever.

AQUA, n. *ā'kwă* or *ăk'wă* [L. *aqua*, water]: a word now much used as part of a compound. AQUAFORTIS, *-fôr'tĭs* [L. *fortis*, strong]: strong water; a powerful acid, so called by the alchemists, now named *nitric acid*. AQUA MARINA, *-mă-rē'nă* [L. *mărĕ*, the sea]: sea-water; applied to the precious stone, beryl, from its color. AQUA MARINE, n. *ā'kwă mă-rēn'*, the varieties of the *beryl* (q.v.) which are green or blue—the yellow variety is strictly called beryl; some green and blue varieties of topaz also have been thus called. AQUA REGIA, *-rē'jĭ-ā* [L. *regĭŭs*, royal]: royal water; a mixture of nitric and muriatic acids; a dissolvent of gold, the king of the metals; now called *nitro-muriatic acid*. AQUA REGINÆ, literally *queen's water*, mixture of concentrated sulphuric acid (oil of vitriol) and nitric acid, or of sulphuric acid and nitre. Either mixture evolves much fumes, and may be used as a disinfectant, as similar mixtures are sold under the name of *everlasting disinfectants*. AQUA VITÆ, *-vī'tē* [L. *vita*, life]: water of life; brandy or other ardent spirit. During the alchemical epoch, brandy or distilled spirits was much used as a medicine, was considered a cure for all disorders, and thought to prolong life; and as Latin was the learned tongue, this restorer of health and prolonger of life was called *aqua vitæ*. AQUATIC, a. *ă-kwăt'ĭk*, living in the water or much on it, as some fowls. AQUARELLE, n. *ăk'wâr-ĕl* [L. dim. of *aqua*, water]: a painting in water colors. AQUARIUM, n. *ă-kwā'rĭ-ŭm*, a glass case containing water, etc., for plants and creatures that live in water; any large building where such cases are kept and exhibited. AQUARIUS, n. *ă kwā'rĭ-ŭs* [L. a water-carrier]: a sign of the zodiac. AQUA TINTA, *ā'kwa tĭn'ta*,

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or AQUATINT, n. *ā'kwŏ-tĭnt* [L. *aqua:* It. *tinta*, a tint or dye—from L. *tingo*, I stain]: a mode of etching on copper, by which imitations of drawings in Indian ink, bister, and sepia are produced. On a plate of copper a ground is prepared of black resin, on which the design is traced; a complicated series of manipulations with varnish and dilute acid is then gone through, until the desired result is attained. The process of A. has fallen into comparative disuse.

AQUA'RIUM: a tank or vessel containing either salt or fresh water, in which either marine or fresh-water plants and animals are kept in a living state. The name was formerly sometimes given to a tank or cistern placed in a hothouse, and intended for the cultivation of aquatic plants. The A., as now in use—originally called *Vivarium* or *Aquavivarium*, and intended chiefly for animals, depends in principle upon the relations discovered by science between animal and vegetable life, and particularly upon the consumption by plants, under the action of light, of the carbonic acid gas given forth by animals, and the consequent restoration to the air or water in which they live of the oxygen necessary for the maintenance of animal life. The A. must therefore contain both plants and animals, and in something

Simple form of an Aquarium.

like a proper proportion. Zoophytes, Annelides, Mollusca, Crustacea, and fishes may thus, with due care, be kept in health, and their habits observed. The water must be frequently *aerated*, which can be accomplished by taking up portions of it and pouring them in again from a small height. The fresh-water A. is frequently provided with a fountain, which produces a continual change of water; but even where this is the case, the presence both of plants and animals is advantageous to the health of both. When sea-water cannot easily be procured for the marine A., a substitute may be made by mixing with rather less than 4 quarts of spring water 3½ ounces of common table-salt, ¼ ounce of Epsom salts, 200 grains troy of chloride of magnesium, and

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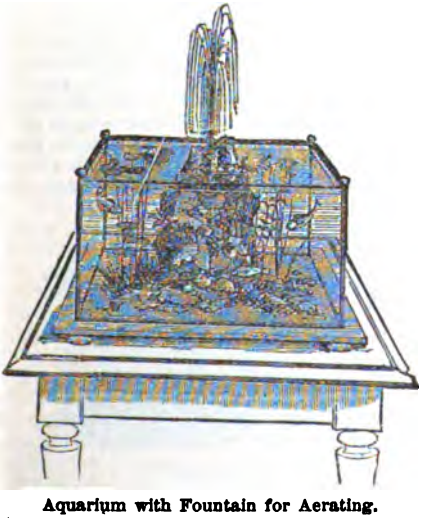
40 grains troy of chloride of potassium. With care, the water may be kept good for a long time. No dead animal or decaying plant must be permitted to remain in it. Salt water, artificially prepared, is not fit for the reception of animals at once; but a few plants must first be placed in it, for which purpose some of the green algæ, species of *Ulva* or *Confervа*, are most suitable. The presence of a number of molluscous animals, such as the common periwinkle, is necessary for the consumption of the continually growing vegetable matter, and of the multitudinous spores (seeds), particularly of confervæ, which would otherwise soon fill the water, rendering it greenish or brownish, and untransparent, and which may be seen beginning to vegetate everywhere on the pebbles or on the glass of the tank. In a fresh-water A., molluscous animals of similar habits, such as species of *Lymnæa* or *Planorbis*, are equally indispensable. For large aquaria, tanks of plate glass are commonly used; smaller ones are made of bottle-glass or of crystal.

Blennies, gobies, and gray mullets are perhaps the kinds



Aquarium with Fountain for Aerating.

of fish most common in marine aquaria; gold-fishes, sticklebacks, and minnows are frequent in fresh-water ones. These have the advantage of being more easily kept in good health than many other kinds, and a further recommendation is found in their small size, and in the fine colors of the gold-fish. The nests of sticklebacks are a subject of unfailing interest. Crabs of various species, and actiniæ or sea-anemones, are very generally among the larger inmates of the A. Serpulæ contribute much both to its interest and beauty, as they spread out their delicate and finely-tinted branchiæ from the mouth of their shelly tube, and withdraw within

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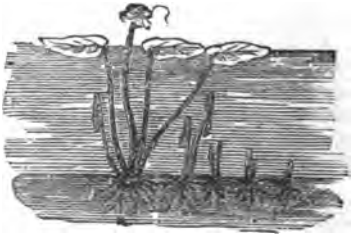
it, quick as thought, upon the slightest disturbance. Balani or acorn-shells are very beautiful objects when they are seen opening their summit-valves, and rapidly stretching out and retracting their little nets. Even periwinkles and limpets are interesting, particularly when they are watched by the aid of a magnifying-glass, as they feed upon the spores of the confervæ which have just begun to vegetate on the glass of the A., moving slowly along, with continual opening and shutting of the mouth, like cows at pasture, when the structure and motions of their mouths and the singular beauty and brilliancy of colors may be observed. The use of a good magnifying lens adds greatly to the interest of the A., and zoophytes of exquisite forms and colors may be watched in the actual processes of life. See WARDIAN CASES.

AQUARIUS, *ă-kwā'rĭ-ŭs*, the Water-bearer: the eleventh sign of the zodiac, through which the sun moves in part of the months of January and February. It is also the name of a zodiacal constellation, whose position in the heavens may be found by producing a line in a southerly direction through the stars in the head of Andromeda and the wing of Pegasus.

AQUAT'IC PLANTS and ANIMALS: those that live either wholly or partly in water. The term is very vaguely used, those plants being often called A. which grow in ponds, ditches, etc., although not only their inflorescence, but great part of their foliage, is above the surface of the water, as well as those which more completely belong to that element; and a similar latitude of meaning prevails with regard to animals. Few phanerogamous (or flowering) plants exist



Aquatic plant.

entirely under water, although there are a few, like the common *Zostera marina*, or Grass-wrack, which do so, and produce even their flowers in that condition; others, of which the greater part of the plant is usually under water, produce their flowers upon, or considerably above, its surface, as those of the genera *Valisneria*, *Anacharis* (q.v.), etc. The leaves, as well as the flowers, of many float upon the water, of which the water-lilies furnish well-known and beautiful examples; while in *Ranunculus aquatilis*, that exquisite ornament of river margins, we have an instance of great diversity between the lower leaves which remain submersed, and the upper leaves which float. Of crypto-

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gamous plants, one great order, *Algæ*, is exclusively A., and these seem adapted to perform under water all the functions of their life. A. plants are, in general, of less compact structure than other plants, thus lighter and better adapted for rising in their growth towards the surface of the water; in order to which also some of the algæ, as may be seen in more than one of the most common sea-weeds, are provided with air-bladders of considerable magnitude. All this is the more necessary, as plants completely A. have generally little firmness of stem, and if their weight made them fall to the bottom would lie in a mass, as they do when withdrawn from the water, in which, however, they gracefully float, their flexibility of stem enabling them to adapt themselves to waves or currents which would destroy them if they were more rigid. So admirably are all things in nature harmonized.

Many animals, to a considerable extent A. in their habits, must not only breathe air, but are adapted for spending great part of their existence on dry land. Such are chiefly those that seek their food in the water. The peculiarities of structure by which they are fitted for wading, for swimming, for diving, and for remaining under water a longer time than other animals can, are very interesting and admirable. Even the fur of the beaver, the otter, the water-rat, and other animals of this description, is not liable to be drenched like that of other quadrupeds; and the plumage of water-fowls exhibits a similar peculiarity. The feet of many are webbed, so as to enable them to swim with great facility; and to this the general form, as in water-fowls, likewise exhibits a beautiful adaptation. The webbed feet in some, of which the habits are most thoroughly A., as seals, assume the character of a sort of paddle, admirably fitted for use in the water, but by means of which they can only move very awkwardly on land. The forms of whales and fishes are remarkably adapted for progression in water; while, instead of the limbs by which other vertebrate animals are enabled to move upon the land or to fly in the air, their great organ of locomotion is the tail, or rather the hinder part of the elongated body itself, with the tail as the blade of the great oar, which all the principal muscles of the body concur to move. Remarkable provision is made in A. animals of the higher vertebrate classes for the maintenance of the requisite animal heat, by the character of the fur or plumage; a purpose which the blubber of whales also most perfectly serves. In the colder-blooded animals, where no such provision is requisite, the structure of the heart is accommodated to the diminished necessity for oxygenation of the blood; and although reptiles in their perfect state must breathe air, many of them can remain long under water without inconvenience. Fishes, and the many other animals provided with branchiæ or gills, breathe in the water itself, deriving the necessary oxygen, which in their case is comparatively little, from the small particles of air with which it is mingled. They cannot subsist in water which has been deprived of air by boiling. Some A. insects carry down with them into the water

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particles of air entangled in hairs with which their bodies are abundantly furnished.

A'QUA TOFA'NA: a poisonous liquid much talked of in the s. of Italy about the end of the 17th c. There is doubt as to its inventor, but it is ascribed to a Sicilian woman named Tofana, who lived first at Palermo, but was obliged, from the attention of the authorities having been attracted to her proceedings, to take refuge in Naples. She sold the preparation in small phials, inscribed 'Manna of St. Nicholas of Bari,' there being a current superstition that from the tomb of that saint there flowed an oil of miraculous efficacy in many diseases. The poison was especially sought after by young wives that wished a riddance of their husbands. The number of husbands dying suddenly in Rome about 1659 raised suspicion, and a society of young married women was discovered, presided over by an old woman named Spara, who had learned the art of poisoning from Tofana. Spara and four other members of the society were publicly put to death. Tofana continued to live to a great age in a cloister, in which she had taken refuge, but was at last (1709) dragged from it, and put to the torture, when she confessed having been instrumental to 600 deaths. According to one account she was strangled; but others affirm that she was still living in prison in 1730.

The A. T. is usually described as a clear, colorless, tasteless, and inodorous fluid; five or six drops were sufficient to produce death, which resulted slowly and without pain, inflammation, or fever; under a constant thirst, a weariness of life, and an aversion to food, the strength of the person gradually wasted away. It is even stated that the poison could be made to produce its effects in a determined time, long or short, according to the wish of the administrator—a notion generally prevalent in those ages respecting secret poisoning. The most wonderful stories are told of the mode of preparing this poison; for example, the spittle of a person driven nearly mad by continued tickling was held to be an essential ingredient. Later investigations lead to the belief that the A. T. was principally a solution of arsenic.

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AQUEDUCT, n. *ăk'wĕ-dŭkt* [L. *aqua*, water, or *aquæ*, of water; *ductus*, led]: a course or channel made for conveying water either under or above ground. AQUEOUS, a. *ā'kwē-ŭs*, watery; pertaining to or arising from water. A'QUEOUS'NESS, n. the quality of being watery. AQUEOUS HUMOR, in *anat.*, the limpid fluid which occupies the space between the crystalline lens and the cornea. AQUEOUS ROCKS, in *geol.*, rocks whose material has been deposited by means of water, and which lie in strata, as opposed to unstratified or volcanic rocks.

AQUEDUCT: an artificial course or channel by which water is conveyed along an inclined plane. When an A. is carried across a valley, it is usually raised on arches, and where elevated ground or hills intervene, a passage is cut, or, if necessary, a tunnel bored for it. Aqueducts were not unknown to the Greeks; but there are no remains of those which they constructed, and the brief notices of them by Pausanias, Herodotus, and others, do not give any distinct notion of their character. The aqueducts of the Romans were among the most magnificent of their works, and the noble supply of water which modern Rome derives from the three now in use, of which two are ancient, gives the stranger a vivid conception of the vast scale on which the ancient city must have been provided with one of the most important appliances of civilization and refinement, when nine were employed to pour water into its baths and fountains.

The following are the names of the Roman aqueducts, chronologically arranged:

1. The *Aqua Appia*, begun by and named after the censor Appius Claudius abt. B.C. 313. It ran a course of between 6 and 7 m., its source being in the neighborhood of Palestrina. With the exception of a small portion near the Porta Capena, it was subterranean. No remains of it exist.

2. *Anio Vetus*, constructed abt. B.C. 273, by M. Curius Dentatus. It also was chiefly underground. Remains may be traced both at Tivoli and near the Porta Maggiore. From the point at which it quitted the river Anio, about 20 m. above Tivoli, to Rome, is about 43 miles.

3. *Aqua Marcia*, named after the pretor Quintus Marcius Rex, B.C. 145, had its source between Tivoli and Subiaco, and was consequently abt. 60 m. long. The noble arches which stretch across the Campagna for some 6 m. on the road to Frascati are the portion of this A. which was above ground.

4. *Aqua Tepula*, B.C. 126, had its source near Tusculum, and its channel was carried over the arches of the last-mentioned aqueduct.

5. *Aqua Julia*, constructed by Agrippa, and named after Augustus, B.C. 34. Like the Tepulan, it was carried along the Marcian Arches, and its source was also near Tusculum. Remains of the three last-mentioned aqueducts still exist.

6. *Aqua Virgo*, also constructed by Agrippa, and said to have been named in consequence of the spring which supplied it having been pointed out by a girl to some of Agrippa's soldiers when in search of water. The Aqua Vergine, as it

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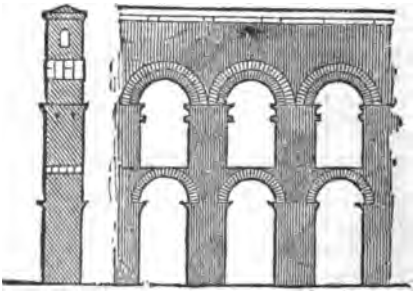
is now called, is still entire, having been restored by the popes Nicholas V. and Pius IV., 1568. The source of the Aqua Virgo is near the Anio, in the neighborhood of Torre Salona, on the Via Collatina, and about 14 m. from Rome. The original object of this A. was to supply the baths of Agrippa; its water now flows in the Fontana Trevi, that of the Piazza Navona, the Piazza Farnese, and the Barcaccia of the Piazza di Spagna. The water of the Aqua Virgo is the best in Rome.

7. *Aqua Alsietina*, constructed by Augustus, afterwards restored by Trajan, and latterly by the popes. This A., now called the Aqua Paola, is situated on the right bank of the Tiber, and supplies the fountains in front of St. Peter's and the Fontana Paola on the Montorio. Its original object was to supply the Naumachia of Augustus, which was a sheet of water for the representation of sea-fights.

8. *Aqua Claudia*, commenced by Caligula, and completed by Claudius A.D. 51. A line of magnificent arches which formerly belonged to this A. still stretches across the Campagna, and forms one of the grandest of Roman ruins. It was used as a quarry by Sextus V. for the construction of the Aqua Felici, which now supplies the Fountain of Termini, and various others in different parts of the city.

9. *Anio Novus*, which was the most copious of all the Roman fountains, though inferior to the Marcia in the solidity of its structure; it was also the longest of the aqueducts, pursuing a course of no less than 62 m. By the two last-mentioned aqueducts, the former supply of water was doubled. In addition to the aqueducts already mentioned, there was the Aqua Trajana, which may, however, be regarded as a branch of the Anio Novus, and



Section.

Aqua Alexandrina.

several others of later construction, such as the Antoniana, Alexandrina, and Jovia, none of which were to be compared with the older ones in extent and magnificence.

Nor was it for the uses of the capital alone that aqueducts were constructed. The A. of Trajan, at Civita Vecchia, which conveys the water a distance of 23 m., and that in the vicinity of Marzana, near Verona, with others that might be mentioned, still attest the existence of aqueducts in

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the smaller towns of Italy in Roman times. Even during the unpromising period which succeeded, the habit of their construction was not abandoned, that of Spoleto having been built by the Lombard Duke Theodolapius in 604. The extraordinary A. by which the fountain at Siena is supplied is said to have occupied two centuries in building; and the modern A. of Leghorn, which is not unworthy of the Roman models after which it was designed, is surpassed in magnificence by that of Pisa, with its thousand arches. In the more distant provinces which fell under the Roman power, aqueducts were likewise constructed—at Nicomedia, Ephesus, Smyrna, Alexandria, Syracuse, and in many of the towns in Gaul and in Spain. At Merida there are the remains of two aqueducts, of one of which there are 37 piers still standing, with three tiers of arches. But the most magnificent structure of this class in Spain, is the A. of Segovia, in Old Castile, for which Spanish writers claim an antiquity beyond that of the Roman dominion; but which, there is reason to believe, belongs to the time of Trajan. At Evora, in Portugal, there is likewise an A. in good preservation, with a *castellum* or reservoir at its termination in the city, consisting of two stories, the lower one being decorated with pillars. But of all the provincial aqueducts, that at Nismes, in Provence, is at once the most remarkable and the best preserved. The following description of it, from Murray's Hand-book for France, gives a vivid idea of the very interesting class of works to which it belongs. 'It consists of three rows of arches, raised one above the other, each smaller than the one below it; the lowest of six arches, the centre tier of eleven, and the uppermost of thirty-five; the whole in a simple if not a stern style of architecture, destitute of ornament. It is by its magnitude, and the skilful fitting of its enormous blocks, that it makes an impression on the mind. It is the more striking from the utter solitude in which it stands—a rocky valley, partly covered with brushwood and greensward, with scarce a human habitation in sight, only a few goats browsing. After the lapse of 16 c., this colossal monument still spans the valley, joining hill to hill, in a nearly perfect state, only the upper part, at the northern extremity, being broken away. The highest range of arches carries a small canal, about 4½ ft. high and 4 ft. wide, just large enough for a man to creep through, still retaining a thick lining of Roman cement. It is covered with stone slabs, along which it is possible to walk from one end to the other, and to overlook the valley of the Gardon. The height of the Pont du Gard is 188 ft., and the length of the highest arcade 873 ft. Its use was to convey to the town of Nismes the water of two springs, 25 m. distant. . . . The conveyance of this small stream was the sole object and use of this gigantic structure, an end which would now be attained by a few iron water-pipes.' Neither the date nor the builder of the Pont du Gard is known with certainty, but it is ascribed to Agrippa, the nephew of Augustus; a conjecture which is rendered probable by the fact of his having restored the Appian, Marcian, and Anienian, and constructed the Julian

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A. at Rome. The importance which the Romans attached to their aqueducts may be gathered from the fact that special officers, invested with considerable authority, and, like all the higher officials, attended by lictors and public slaves, were appointed for their superintendence. Under the orders of these 'guardians of the waters,' we are told that, in the time of Nerva and Trajan, about 700 architects and others were employed in attending to the aqueducts. These officials were divided into various classes, and known by different names, according as their duties related to the care of the course of the A., the *castella* or reservoirs at its termini, the pavement of the channel, the cement with which it was covered, and the like.

Among modern aqueducts (using the word in its restricted sense of a masonry construction for water-conveyance) the A. built to convey the waters of the river Eure to Versailles, France, is considered in many respects the finest in the world. It is about five-sixths of a m. long, more than 200 ft. high, and contains 726 50 ft. arches, divided into three rows. The subterranean A., which conducts water to the village of Arcueil, France, is 44,-300 ft., or more than 8 m. long and 6 ft. high. A similar A., belonging to the Versailles system, is 11,760 ft. long. The great water-works which supply Marseilles include several aqueducts, of which the largest crosses the ravine of the river Arc, about 5 m. from Aix, and is 1,287 ft. long and 262 ft. high.

The Liverpool A. is one of the largest in the world; length 70 m., capacity 40,000,000 gallons per day. The supply is drawn from Lake Vyrnwy, Wales, whose available contents are over 12,131,000,000 gallons. Total cost of the work, about $10,000,000.

For the Croton A. of New York, and for several others, see titles of various cities. See WATER SUPPLY.

AQUEOUS HUMOR, *ā'kwē-ŭs:* the fluid which occupies the space in the eye between the back of the cornea and the front of the lens, which, in fœtal life, is divided into an *anterior* and *posterior* chamber by the membra pupillaris (q.v.), and in adult life by the iris. It consists of water, with, according to Berzelius, about a fiftieth of its weight made up of chloride of sodium and extractive matters held in solution.

Anatomists are not agreed as to the spring of this watery secretion, and are inclined to doubt the existence of a special secreting membrane, which used to be taken for granted. However, a layer of delicate epithalial cells, which exists at the back of the cornea (q.v.), is probably concerned in its formation. It is rapidly re-secreted if allowed to escape by any wound in the cornea, and in some cases is formed in such quantity as to cause dropsy of the eye (*hydrophthalmia*).

A'QUEOUS ROCKS: rocks, whose material has been deposited by means of water. In Geology, every layer which forms a portion of the solid crust of the earth is called a rock, whether its particles are incoherent, like soil or sand, or compacted together, like limestone or sandstone.

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In this wide sense, the rocks of the earth's crust are either igneous (q.v.) or sedimentary. These sedimentary rocks have an aqueous origin, with the exception of a very limited number, like drift-sand, which are brought into their present position by the action of the wind. Unlike the igneous rocks, whose particles have asumed their present form in the position they occupy, the materials of the A. R. have evidently been brought from a distance. They owe their origin to some older rocks, whose decomposition or destruction has afforded the materials. The parent rock can often be identified. Its distance is indicated by the condition of the materials, whether they are rounded and water-worn, or angular and shingly.

The agents now at work, and which have been active in past geological ages, rubbing down and transporting the materials from which these rocks are formed, are the following: 1. *The sea*, destroying the rocks and cliffs, and beaches which form its boundary, and carrying off the eroded materials to form new rocks below the level of the sea. 2. *Rivers*, including the action of their smallest tributary rills. and even of the drops of rain, for these abrade and carry off the almost imperceptible particles from the surface where they fall; and when united they form the rill with its suspended sediment, and these again unite to form the river, which in its course not only retains what it has got, but scoops up more from its own bed, and carries all to the sea or lake, to deposit it there as a new stratum. It is difficult to estimate the influence of this agency. Sir Charles Lyell calculates that the Nile annually deposits in the Mediterranean 3,702,758,400 cub. ft. of solid matter. 3. *Glaciers and icebergs*. These enormous moving masses of ice are not only loaded with rock-fragments, which are deposited as the ice melts, but are ever abrading the rocks over which they pass, and thus supply materials to form new layers. 4. Several stratified rocks have an evidently *organic origin*, such as chalk, and some limestones chiefly composed of animal remains, and coal consisting of vegetable carbon; but even these have been influenced in their formation by water so much as to justify us in classifying them with A. R. 5. The same remark applies to rocks which have been *precipitated from a fluid* with which the materials existed in chemical combination, as has been the case with beds of salt, gypsum, and calcareous tufa.

The result of these various actions is a series of rocks which, from their composition, may be classed as Arenaceous, Argillaceous, Calcareous, Carbonaceous, Saline, and Silicious. (See these titles.)

The arrangement of the A. R. depending on their different ages, is of more importance in modern geology than that depending on their internal constitution. When a section of the earth's crust is examined, it is found to be composed of a series of layers which have been produced in succession. Comparing this with sections in other districts, it is noticed that there is a regularity in the several parts; for beds of the same structure are found in different localities, and these occupy the same relative position to the

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adjacent beds. A number of observations have shown that the crust of the earth is composed of a *regular* series of earthy deposits formed one after another, during successive periods of time. This general induction forms the basis of the following classification. For the description of the included strata we must again refer to the names of the different divisions:

I. QUATERNARY AND TERTIARY AGE—1. Superficial Deposits or Recent Period; 2. Pleistocene Period; 3. Pliocene or Upper Tertiary Period; 4. Miocene or Middle Tertiary Period; 5. Eocene or Lower Tertiary Period.

II. SECONDARY OR MESOZOIC AGE—6. Cretaceous Period; 7. Oolitic Period; 8. Triassic Period.

III. PRIMARY OR PALÆOZOIC AGE—9. Permian Period; 10. Carboniferous Period; 11. Devonian or Old Red Sandstone Period; 12. Silurian Period; 13. Cambrian Period.

AQUIFEROUS, a. *ā-kwĭf'ér-ŭs* [L. *aqua*, water; *fero*, I bear]: water-bearing; denoting vessels or canals by which water is distributed throughout an organism.

AQUIFOLIACEÆ, *ăk-wĭ-fō'lĭ-ā'sē-ē:* natural order of dicotyledonous or exogenous plants, of which the common holly (q.v.) is the best known example, and the only species that is a native of Europe. The order, however, contains more than one hundred species, the greater part of which are natives of America, and many of them belong to the tropical and subtropical parts of it. The species are all evergreen trees or shrubs, with simple, leathery leaves, and without stipules. The flowers are small and axillary, with 4-6 sepals, and a 4-6-parted corolla, into which the stamens are inserted, alternating with its segments. The ovary is fleshy and superior, with two or more cells, a solitary anatropal pendulous ovule in each cell, the cells generally becoming bony as distinct *stones* in the fruit, which is fleshy. The order is allied to *Rhamnaceæ*, *Celastraceæ*, and *Ebenaceæ*. The most interesting species belong to the genus *Ilex*, or HOLLY (q.v.).

AQUILA: see EAGLE.

AQUILA, *ä'kwē-lä:* cap. of the Italian province of the same name; on the Pescara, near the loftiest of the Apennines; a fortified town of the fourth class, though its citadel is its only strong point. A. was built by the emperor Frederic II. from the ruins of the ancient *Amiternum*, a town of the Sabines, and the birthplace of Sallust the historian. In 1703, it was almost destroyed by an earthquake, in which 2,000 persons perished. A. is a bishop's see, has civil and criminal courts, and a lyceum, and is considered one of the best built towns in the kingdom. In 1841, much political disturbance took place here, and several of the inhabitants were imprisoned and put to death in consequence. Altogether, public feeling in this town and province is far more liberal than in most other parts of the kingdom. Pop. (1881) 18,426 ; province (1885) 371,382; (1891) 374,882.

AQUILA, *ăk'wĭ-la*, PONTICUS: celebrated translator of the Old Testament into Greek, lived abt. 130; b. Sinope;

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said to have been a relation of the emperor Hadrian, and to have been first a Pagan, then a Christian, and finally a Jew; submitting in his last conversion to the peculiar religious ceremony of circumcision. His translation of the Old Testament—which appears to have been undertaken for the benefit of his Hellenized countrymen, was so *literal*, that the Jews preferred it to the Septuagint, as did also the Judaizing sect of Christians called Ebionites. Only a portion of the work remains, which has been edited by Montfaucon and others.

AQUILARIACEÆ, *ăk'wĭ-lā-rĭ-ā'sē-ē:* natural order of dicotyledonous or exogenous plants, containing only about ten known species, all of which are trees with smooth branches of tough bark, natives of the tropical parts of Asia. The leaves are entire; the perianth leathery, turbinate, or tubular, its limb divided into four or five segments; the stamens usually ten; the filaments inserted into the orifice of the perianth; the ovary two celled, with two ovules; the stigma large; the fruit a 2-valved capsule, or a drupe. The order is chiefly interesting as producing the fragrant wood called ALOES WOOD (q.v.).

AQUILEGIA: see COLUMBINE.

AQUILEJA, *â-kwe-lā'yâ*, or AGLAR' (earlier, Velia or Aquila): small town in Austria, at the head of the Adriatic, 22 m. w.n.w. of Trieste. Pop. about 2,000. It is now sunk in utter insignificance, possessing no trade or public buildings of any note, except its cathedral; but in the time of the Roman emperors, it was one of the most important places n. of the metropolis. Its commerce was flourishing, for though 8 m. distant from the sea, vessels could reach it by canals connecting it with the rivers in its vicinity. It was both the central point of the transit trade between the n. and s. of Europe, and the key of Italy against the barbarians. Founded by a Roman colony, B.C. 181, it became a favorite residence of Augustus; and A.D. 168, was so strongly fortified by Marcus Aurelius, as to be considered the first bulwark of the empire on the n. It was called *Roma Secunda*, the Second Rome. Here the emperor Maximin perished; and in the vicinity Constantius lost his life in a battle against his brother Constans. When the town was destroyed by Attila (452), it had 100,000 inhabitants. It never recovered, although it received some ecclesiastical honors, but has continued slowly dwindling down into deeper obscurity and wretchedness. There are numerous remains of its former splendor. Councils were held at A. in 381, 558, 698, and 1184.

AQUILINE, a. *ăk'wĭ-lĭn* [L. *aquila*, an eagle]: hooked or curved like the beak of an eagle.

AQUILON, n. *ăk'wĭ-lŏn* [F. *aquilon*—from L. *aquilōnem*, the north wind]: the swift-flying thing; in *OE.*, the north wind; Boreas.

AQUINAS, *a kwī'nas*, THOMAS, or THOMAS OF AQUINO: 1224-74; b. in the castle of Rocca Secca; of the family of the Counts of Aquino, in the kingdom of Naples: one of the

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most influential of the scholastic theologians. He received the rudiments of his education from the Benedictine monks of Monte-Casino, and completed his studies at the Univ. of Naples. A strong inclination to philosophical speculation determined the young nobleman, against the will of his family, to enter (1243) the order of Dominicans. In order to frustrate the attempts of his friends to remove him from the convent, he was sent away from Naples, with the view of going to France; but his brothers took him by force from his conductors, and carried him to the paternal castle. Here he was guarded as a prisoner for two years, when, by the help of the Dominicans, he contrived to escape, and went through France to the Dominican convent at Cologne, in order to enjoy the instructions of the famous Albertus Magnus (q.v.). According to another account, he owed his release from confinement to the interference of the emperor and the pope. At Cologne he pursued his studies in such silence, that his companions gave him the name of the 'Dumb Ox.' But Albert, his master, is reported to have predicted, 'that this ox would one day fill the world with his bellowing.' Thoroughly imbued with the scholastic, dialectic, and Aristotelian philosophy, he came forward, after a few years, as a public teacher in Paris. His masterly application of this philosophy to the systematizing of theology, soon procured him a distinguished reputation. It was not, however, till 1257, that A. obtained the degree of doctor, as the university of the Sorbonne was hostile to the mendicant monks. He vindicated his order in his work, *Contra Impugnantes Dei Cultum et Religionem;* and, in a disputation in presence of the pope, procured the condemnation of the books of his adversaries. He continued to lecture with great applause in Paris, till Urban IV., in 1261, called him to Italy to teach philosophy in Rome, Bologna, and Pisa. Finally he came to reside in the convent at Naples, where he declined the offer of the dignity of archbishop, in order to devote himself entirely to study and lecturing. Being summoned by Gregory X. to attend the General Council at Lyons, he was surprised by death on the way, 1274, at Fossanuova, in Naples. According to a report, he was poisoned at the instigation of Charles I. of Sicily, who dreaded the evidence that A. would give of him at Lyons.

Even during his life A. enjoyed the highest consideration in the church. His voice carried decisive weight with it; and his scholars called him the 'Universal,' the 'Angelic Doctor,' and the 'Second Augustine.' A general chapter of Dominicans in Paris made it obligatory on the members of the order, under pain of punishment, to defend his doctrines. It was chiefly the narratives of miracles said to have been wrought by A. that induced John XXII., in 1323, to give him a place among the saints. His remains were deposited in the convent of his order at Toulouse. Like most of the other scholastic theologians, he had no knowledge of Greek or Hebrew, and was almost equally ignorant of history; but his writings display a great expenditure of diligence and dialectic art, set off with the irresistible eloquence of zeal. His chief works are—a *Commentary on the Four*

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Books of Sentences of Peter Lombard, the *Summa Theologiæ*, *Quæstiones Disputatæ et Quodlibetales*, and *Opuscula Theologica*. He gave a new and scientific foundation to the doctrine of the church's treasury of works of supererogation, to that of withholding the cup from the laity in the communion, and to transubstantiation. He also treated Christian morals according to an arrangement of his own, and with a comprehensiveness that procured him the title of the 'Father of Moral Philosophy.' The definiteness, clearness, and completeness of his method of handling the theology of the church gave his works a superiority over the text-books of the earlier writers on systematic theology. His *Summa Theologiæ* is the first attempt at a complete theological system. Accordingly, Pius V., to whom is due the publication of the completest collection of A.'s works (18 vols., Rome, 1570; a newer but less trustworthy ed., 23 vols., Paris 1636–41), ranks him with the greatest teachers of the church. In his philosophical writings, the ablest of which is his *Summa Fidei Catholicæ contra Gentiles*, he throws new light over the most abstract truths. The circumstance of A. being a Dominican, and boasted of by his order as their great ornament, excited the jealousy of the Franciscans against him. In the beginning of the 14th c., Duns Scotus (q.v.), a Franciscan, came forward as the declared opponent of the doctrines of A., and founded the philosophico-theological school of the Scotists, to whom the *Thomists*, mostly Dominicans, stood opposed. The Thomists leaned in philosophy to Nominalism (q.v.), although they held the abstract form to be the essence of things; they followed the doctrines of Augustine as to grace, and disputed the immaculate conception of the Virgin. The Scotists inclined to Realism (q.v.), and to the views of the Semipelagians, and upheld the immaculate conception.

AQUITANIA, *ăk·wĭ-tā'nĭ-a:* Latin name of a part of Gaul, originally including the country between the Pyrenees and the Garonne, peopled by Iberian tribes. Augustus, when he divided Gaul into four provinces, added to A. the country lying between the rivers Garonne and Loire. Afterwards A. passed into the hands, first, of the West Goths, and then of the Franks; and during the Merovingian dynasty, became an independent duchy. Though subjugated by Charlemagne, the duchy again claimed independence under the weak monarchs of the Carlovingian dynasty. In 1137, it was united to the crown of France by the marriage of Louis VII. with Eleanor, heiress of A. In 1152, A. became an English possession through the marriage of Henry II. with Eleanor, whom Louis had divorced, and a long series of disputes took place between England and France respecting A., which was at length ultimately united to the crown of France by Charles VII., 1451.

ARAB, n. *ăr'ăb*, or ARABIAN, n. *ă-rā'bĭ-ăn*, a native of Arabia. ARABIC, a. *ăr'ă-bĭk*, or ARABIAN, a. *ă-rā'bĭ-ăn*, pertaining to Arabia or to the language of its people. AR'ABIC, n. the language. ARABIST, n. *ăr'ă-bĭst*, one versed in Arabic. ARABESQUE, a. *ăr'ă-bĕsk* [F.]: in the

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manner of the Arabian architecture: N. an ornament in *arch.*, consisting of imaginary foliage, stalks, plants, etc.; the Arabic language. AR'ABISM, n. *-bizm*, an Arabic idiom. ARABY, n. *ăr'ă-bĭ*, *poetic* for Arabia. ARABS, n. plu., the wandering tribes of Arabia and Northern Africa; now applied to the destitute children wandering in the streets of towns. ARABIC NUMERALS, the ordinary figures used in arithmetic, introduced into Europe by the Arabians.

ARABA, n. *âr'ă-bâ* [Hindustani, etc.]: a wheeled carriage; a gun-carriage; a kind of cart used in Eastern journeys or campaigns. Those of the higher classes are usually ornamented by carvings on the sides, rich fringes depending from the covering, etc.

ARABATA, n. *âr-a-bâ'ta* [Native name]: an American monkey (*Mycetes stramineus*).

ARABESQUE, *ăr'ă-bĕsk:* meaning merely *after the Arabian manner*, so far as its etymology is concerned, might be general in its application. It is, however, used especially to characterize a peculiar kind of fantastic decoration commonly employed in conjunction with architecture, and which the Spanish Moors are supposed to have introduced into modern Europe. But the species of enrichment to which this term is now applied was extensively employed both by the Greeks and Romans, the latter in particular being masters of the style. The Egyptians, from whom the Moors probably derived their original notions of this and other forms of art, also employed it in enriching their monumental decorations. But the A. of the Moors differed from that of the Egyptians in entirely excluding the figures of animals, the representation of which was forbidden by the Mohammedan religion, and confining itself entirely to the foliage, flowers, fruit, and tendrils of plants and trees, curiously and elaborately intertwined. This limitation of the field of A. was again departed from when the decorations were discovered on the walls of the baths of Titus, in the time of Leo X.; and more recently those in the houses at Herculaneum and Pompeii came to form the models of imitation, and the modern A. consists usually of combinations of plants, birds, and animals of all kinds, including the human figure, and embracing not only every natural variety, but stepping without hesitation beyond the bounds of nature. The freedom with which it admits the fantastic is, indeed, the leading peculiarity of A., which F. Schlegel termed 'the oldest and original form of fancy.' The arabesques with which Raphael adorned the

Arabesque Panel. From the Mosque at Cordova.

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Apse.—Church of Sta Maria-in-Trastevere, Rome.

Aqueduct of Segovia, Spain.

Aqueduct.—Pont du Gard, Nimes.

Araba. (From Lewis's *Constantinople.*)

Cinque-cento **Arabesque**, from tomb in Church of S. Pietro-in Vinculo, Rome.

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galleries of the Vatican, and which he is said to have imitated from those which he had been instrumental in discovering in the baths of Titus, are at once the most famous and the most beautiful which the modern world has produced. Arabesques are usually painted, though the term is also applied to sculptural representations of similar subjects in low relief, and to carved or molded metal work. See GROTESQUE: ORNAMENTATION.

ARABGIR, *ä-räb-ghēr'*, or ARABKIR, *-kēr'* (anc. *Anabrace*): town of Asiatic Turkey, in the vilayet of Sivas; in a mountainous and rocky district, not far from the Euphrates; 150 m. s.s.w. from Trebizond. It is to the enterprise and industry of the Armenians that the town owes its prosperity. It is noted for the manufacture of goods from English cotton yarn. The neighboring country is inhabited by Turcomans. Pop. abt. 30,000; of which nearly one-fourth Armenians, and three-fourths Turks.

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ARABIA, *ă-rā'bĭ-a*—called by the inhabitants, Jezirat-al-Arab (the peninsula of A.); by the Turks and Persians, Arabistân: the great s.w. peninsula of Asia; 12° 40′—34° n. lat., and 32° 30′—60° e. long. Its greatest length from n.w. to s.e. is about 1,800 m.; its mean breadth, about 600; 1,230,000 sq. m. It is bounded on the n. by the highlands of Syria, and the plains of Mesopotamia (or by a line from El Arish on the Mediterranean to the Euphrates delta); on the e., by the Persian Gulf and the Gulf of Oman; on the s., by the Arabian Sea; and on the w., by the Red Sea and the Suez canal. Midway between Mecca and Medina runs the tropic of Cancer. Ptolemy is supposed to be the author of the famous threefold division into *Arabia Petræa*, i.e., the Arabia of the city of Petra, in the n.w.; *Arabia Felix* (an incorrect translation of *Yemen*, which does not signify 'happy,' but the land lying to the *right* of Mecca), along the w. and s.w. coasts; and *Arabia Deserta*, in the interior. The more precise divisions are; the *Sinaitic Peninsula* (see SINAI), between the Gulfs of Suez and Akaba; the *Hedjaz* (Land of Pilgrimage), the larger and northern strip to the e. of the Red Sea; *Yemen*, the s. and smaller strip to the e. of the Red Sea; *Hadramaut*, the region along the southern coast; *Oman*, the extreme s.e. end of the peninsula, as large as England and Wales; *El-Hasa*, along the Persian Gulf; *Nejd*, the Central Highlands of Arabia.

In shape, A. is an irregular parallelogram, broadest at the s. end; in character, it is mainly African. The vast central plateau rises from a height of 2,500 ft. in the n. to 7,000 ft. in the s.w., and is bounded by w. and s. mountain chains, the former attaining, s. of Mecca, a height of 8,500 ft. Between the mountains and the sea is a low hot strip of land, partially fertile, of varying width. There is a desert in the n. of the interior, the mountainous country of Nejd near the very centre, and to the s. of Nejd another very sterile sandy desert. Hedjaz and Yemen extend from the Red Sea indefinitely towards the interior, and consist partly of the *Tehama*, or low country, along the sea, and partly of the mountain district beyond. Mecca and Medina are in Hedjaz. Yemen is on the whole well watered, has rich and fertile valleys, and contains one-fifth of the whole population of Arabia. Yemen has two very important commercial towns, Mocha and Loheia, on the coast of the Red Sea. Hadramaut is little known, but resembles the Hedjaz in character. Oman is mainly mountainous, is partly very fertile, and possesses the good harbor of Muscat. It has some manufactures of cotton, silk, and arms. Large portions of A. are perfectly arid, but the more fertile portions are so extensive as to constitute two-thirds of the total area: one-third of the whole may be accounted desert and uninhabitable.

Our knowledge of the interior of A. is still very imperfect in detail. The largest portion of it lies in that great desert zone which stretches from the shores of the Atlantic to those of the Northern Pacific. Nejd, the E. highland or central plateau of A., is a compact settled district, culminating in the crescent-shaped Jebel Toweyk, intersected by numerous

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valleys, roaring torrents during the rains, but dry depressions at other times, North of Nejd, and separated from it by a narrow arm of Nefud, or the n. desert of A., is the smaller plateau of Jebel Shomer, crossed by the ranges of Jebel Aja and Jebel Selma. The n. desert, partly stony, and partly a burning expanse of red sand, is thinly sprinkled over with oases of wells and grass, serving as halting-places for the caravans of merchants or pilgrims. The oasis of *Jauf*, 60 m. long by 10 m. broad, contains three flourishing villages. *Dahna*, the s. and main desert of A., extends from Nejd and the Hadramaut coast range, and has never been explored by any European. It is, however, an almost absolutely sterile sand-waste. See MUSCAT: ZANZIBAR.

Politically, Hedjaz, Yemen, and El Hasa are really three Turkish provinces; the Sinaitic Peninsula is in Egyptian hands; England exercises much influence in Hadramaut through her possession of Aden; the sultan of Oman is practically independent, and in alliance with England; Nejd, the seat of the once powerful Wahabi State (see WAHABIS), may be said to be independent, though the emir of Shomer or Shammar, its most powerful potentate, pays a small annual tribute to the sherif of Mecca, in recognition of Turkish supremacy.

A. has, on the whole, an African climate. Though surrounded on three sides by the sea, its chains of hills exclude in a great measure the modifying influence of currents of air from the ocean. In several parts of A. hardly a refreshing shower falls in the course of the year, and vegetation is almost unknown: in other sultry districts, the date-palm is almost the only proof of vegetable life. Over large sterile tracts hangs a sky of almost unbroken serenity. The short rainy season which occurs on the w. coast, during the summer months in England and the United States, fills periodically the *wadis* (hollow places) with water, while slight frosts mark the winters in the centre and n.e. During the hot season, the Simoom (q.v.) blows, but only in the n. part of the land. The terraced districts are more favorable to culture, and produce wheat, barley, millet, palms, tobacco, indigo, cotton, sugar, tamarinds, excellent coffee, senna, and many aromatic and spice plants, as balsam, aloe, myrrh, frankincense, etc. A. is destitute of forests, but has vast stretches of desert grass fragrant with aromatic herbs, and furnishing admirable pasturage for the splendid breed of horses. Coffee, one of the most important exports, is an indigenous product both of A. and Africa.

In the animal kingdom, an African character prevails generally. Sheep, goats, and oxen satisfy the immediate domestic and personal necessities of the inhabitants, to whom the camel and horse are trusty companions in their far wanderings. Gazelles and ostriches frequent the oases of the deserts, where the lion, panther, hyena, and jackal hunt their prey. Monkeys, pheasants, and doves are found in the fertile districts, where flights of locusts often make sad devastation. Fish and turtle abound on the coast. The noble breed of Arabian horses has been cultivated for several thousand years; but the most characteristic of all animals in

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the peninsula is the camel, which has been both poetically and justly styled 'the ship of the desert.' It may be regarded as an Arabian animal, for it seems to be proved that it is not a native of Africa, but has migrated from the peninsula with its master. The camel is not found among the figures of animals in the ancient Egyptian paintings on walls, nor does it appear to have been known to the Carthaginians. The breed of Oman is celebrated for its beauty and swiftness. Among the minerals of A. are iron, copper, lead, coal, basalt, and asphaltum, and the precious stones, emerald, carnelian, agate, and onyx. Pearls are found in the Persian Gulf.

But the most interesting feature of the peninsula is its ancient and peculiar population. The Arab is of medium stature, muscular make, and brown complexion. Earnestness and lofty pride look out of his glowing eyes; by nature he is quick, sharp-witted, imaginative, and passionately fond of poetry. Courage, temperance, hospitality, and good faith are his leading virtues; but these are often marred by a spirit of sanguinary revenge and rapacity. His wife keeps the house and educates the children.

Arabian life is either *nomadic* or *settled*. The wandering tribes, or Bedouins, who have, however, their allotted winter and summer camping-grounds, and a strong home-feeling, entertain notions of the rights of property differing seriously from those regulating the West, yet even their most marauding tribes are not without a traditional code of law and honor. The settled tribes, styled Hadesi and Fellahs, are despised by the Bedouins, who, breathing a pure air, and living on a simple diet, are physically and morally their superiors. Arabia 'is the anti-industrial central point in the world;' for here centuries pass away without any improvement save what has been introduced, almost compulsorily, by foreigners. The export of coffee, dates, figs, spices, and drugs, though still considerable, is said to be only a shadow of the old commerce which existed before the circumnavigation of Africa, or when Aden was in its prime, and the Red Sea was the great commercial route. A. has few manufactures, but carries on a transit-trade in foreign fabrics, besides importing these to some extent for its own necessities. Education is mostly confined to that within the household, where, however, a boy is instructed in reading and writing, in grammar, history, and poetry, and where he is trained to habits of politeness and self-restraint. In the few higher public schools, writing, grammar, and rhetoric compose the whole curriculum. The government is patriarchal, and the chief men of the various tribes have the title of Emir, Sheik, or Imaum. Their function appears limited to leading the troops in the time of war, to levying tribute, and to the administration of justice. A spirit of liberty in the people moderates the authority of their chieftains; but instances of extreme despotism have not been unfrequent both in early and modern times.

History.—The history of A. before the time of Mohammed is involved in mystery, and has little interest, on account of its want of connection with the world's general

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progress. As indicative of the African origin of the Arabs, the following particulars have been specified: the writings *Hamasa* and *Kitab-el aghanee*, which represent the 'pure' Arabs as having first settled on the extreme s.w. of the peninsula, thence spreading n. and e.; the name Himyar (dusky) which is applied to the ruling class, sometimes to the entire nation; the Himyaric tongue, which, as preserved in some proper names, etc., shows decided African affinities; the kinship between the pre-Islamitic institutions of Yemen and those of the historic Egyptians, and even of the modern Abyssinians; the African bearing of the physique and manners of the pure-blooded Arabs; the facility of marriage between the s. Arabs and the Africans, and the fecundity of such unions. The earliest trustworthy records present to us an Arabia of different kingdoms and federal governments, clustered round the desert interior, and all more or less under the rule of a race of southern origin. Yemen (q.v.) most prosperous of these, must, as the fragmentary native records which have come down to our time attest, have enjoyed a considerable degree of civilization, with an extensive commerce, a poetic literature, and practical arts; its institutions showing some affinity to those of the Nile Valley, on the other side of the Red Sea. The Himyaritic dynasty long ruled in Yemen; and *Himyaritic* is still used of the relics of the oldest s. Arabian tongue. Hira, in the n.e. prov. of Arabian Irak, on the other hand, assimilated somewhat to the neighboring Persia; Ghassan, in the n.w., approaching more to a Byzantine complexion. In the 5th c. we find the Koreyah clan, from which Mohammed (q.v.) sprung, predominating in A., and masters of the sacred shrine of Káabeh within the precincts of Mecca, a possession giving them not only a religious pre-eminence in the peninsula, but the disposal of the accumulated offerings of gold, silver, jewels, etc., in the temple, a fund of wealth which they increased by commerce on the Red Sea coast. In the pre-Islamite times, too, was held the great annual fair of Okad, in a plain of the same name, and at a day's journey from Mecca; a fair at which horse races, gymnastic sports, poetic contests, and other amusements enlivened the seriousness of trade transactions. In the reign of Augustus, Ælius Gallus, the Roman prefect of Egypt, at the head of a large army, unsuccessfully attempted the reduction of Yemen to the Roman empire. In 529, however, Yemen was conquered by a large Abyssinian army, and was kept in subjection to the Ethiopians for 76 years. Christianity found an early entrance into Arabia. The Jews, in considerable numbers, migrated into A. after the destruction of Jerusalem, and made many proselytes, especially in Yemen. This diversity of creeds in the peninsula was favorable to the introduction of the doctrine of Mohammed, which forms the grand epoch in Arabian history, and brings it into close connection with the general history of civilization. Now, for the first time, the people of A. became united under one sceptre and one creed, and powerful enough to erect new empires in three quarters of the world; in Palestine, Mesopotamia, and Persia; in Egypt and the n. of Africa; in Spain. The dominion

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of the Arabs, from the time of Mohammed to the fall of the Caliphate of Bagdad, 1258, or even to the expulsion of the Moors from Spain, 1492, is an important period in the history of civilization. See MOORS: CALIPH. But the movements which had such great effects on the destinies of other nations left the peninsula itself in an exhausted condition. Then followed the subjugation of Yemen by the Turks in the 16th c.; their expulsion in the 17th c.; the dominion of the Portuguese over Muscat, 1508–1659; the conquests of Oman, and the temporary victories gained by the Persians at the close of the 16th c.; and, lastly, the appearance of the Wahabis (q.v.), 1770. The progress of the latter was interrupted by Mehemet Ali (q.v.), the pasha of Egypt, who subjugated the coast-country of Hedjaz, with some parts of the coast of Yemen. The events of the year 1840, in Syria, compelled Mehemet, however, to resign all claims upon the territories lying beyond the Red Sea. Since then, the political conditions have come to be as described above: see also WAHABIS. Arab influences are, of course, still powerful beyond the limits of the peninsula, in many parts of Africa, and especially in n. Africa and Egypt. Pop. of A. conjectured not much above 5,000,000.

ARA'BIAN ARCHITECTURE: usual term for Moorish or Mohammedan architecture. So inseparable is the connection between architecture and religion that it may be stated as a general rule that no sooner is a new religion engendered than it finds expression in new architectural forms. Of this, an interesting instance is in the simultaneous rise of Mohammedanism, and of the style of architecture commonly called Arabian or Moorish, but to which the name of Mohammedan might far more appropriately be given, seeing that it has everywhere followed the religion of the Crescent, and that the Arabians previously had no architecture peculiar to themselves. It is further remarkable that this style seems to have arisen undesignedly, or without conscious effort on the part of the people among whom it first appeared. The followers of the Prophet contemplated nothing peculiar in their ecclesiastical structures; and at first their mosques were built by Christian architects from Constantinople. As a natural consequence, they resembled Byzantine churches modified, in the countries of which the Moors successively possessed themselves, by the features of the existing churches. Gradually the new and fanciful ornamentation known as Arabesque (q.v.) was added to the recognized features of Greek and Roman edifices. The exclusion of animal figures, which their abhorrence of the very appearance of idolatry necessitated, confined the Mohammedan artists to the imitation of vegetable productions, varied by geometrical patterns and inscriptions, of which the letters were woven into forms suited for architectural uses. But the most original feature in their edifices, and that by which they have continued to be marked from all others, is the horse-shoe arch. The example in the illustration presents a form which, notwithstanding its extreme beauty, has, strange to say, scarcely ever been imitated in the Christian church. The pointed arch, on the other hand,

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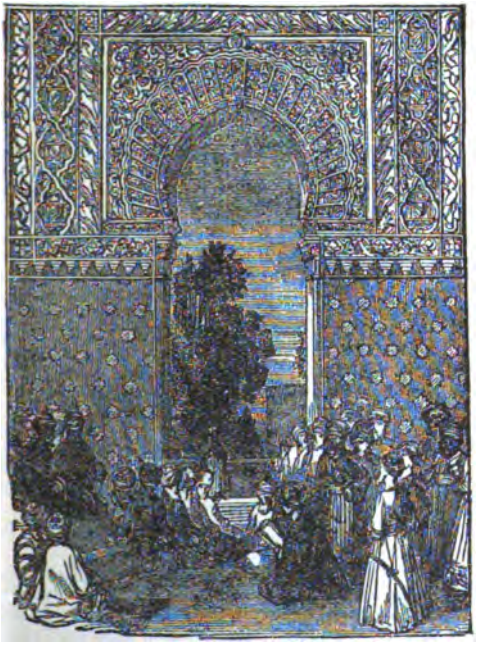
and the various forms of the trefoil and quatrefoil arches, though there can be little doubt that we are indebted for them to the rich invention of the Moorish architects, have become so entirely Christian as to be no longer associated in our minds with the religion of the Prophet. It is said that



Moorish Gateway.

the pointed arch is to be found in Mohammedan buildings as early as 780 (Parker's *Glossary of Architecture*), whereas the earliest examples of its use in Christian architecture belong to the 12th c. Moorish architecture probably reached its highest point of development in the Alhambra.

ARABIAN GULF: see RED SEA.

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ARABIAN LANGUAGE AND LITERATURE: included in the Semitic family. Regarding the oldest literary culture of the Arabians, we have but slight information. That their poetry at least must have had a very early development, may be inferred from the natural disposition of the inhabitants, characterized for their high spirit, courage, love of adventure, and delight in the glory of war. As far back as Solomon's time, the queen of Sheba (probably *Arabia Felix*) was noted for her sententious sayings. The nomadic tribes, living under the patriarchal rule of their sheiks, possessed everything that was favorable to the growth of a simple and natural poetry. They had quick and vivid feelings, and a rich, glowing fancy, which, operating upon the perils, the hardships, and strange confederate life they led in those barren sand deserts, and among naked rocks, could hardly fail to call forth a wild and vigorous minstrelsy. Before the time of Mohammed, the Arabians had celebrated poets who sang the feuds of tribes, and the praises of heroes and fair women. During the great fairs at Mecca and Okadh, poetic contests were held before the people as at the Grecian games; and the poems to which the prize was awarded, were re-written in golden characters, and suspended in the Kaaba at Mecca, the venerable national temple which the Mohammedans affirm to have been built by Abraham, or Ishmael. They are termed the *Moallakât*—i. e., 'the Suspended'—from the honor conferred on them, and are remarkable for their pathos, soaring conceptions, richness of imagery and phraseology, free and unconstrained spirit, and the glow of their love and hate. Among the famous poets of this early period are Nabegha, Asha, Shanfara—whose works were translated and published by De Sacy in his *Chrestomathie Arabe*—and, lastly, Kaab-ben-Zohair, who lived to celebrate the praises of the prophet Mohammed.

But the most brilliant period of Arabic culture is that which Mohammed himself inaugurated in the Koran. His new doctrines of faith and life, collected under this title by the first caliph, Abubekr, were revised and published by Othman, third caliph. The naturally adventurous spirit of the Arabs found a suitable excitement in the half-religious, half-military system of Mohammed; and, after his death, their fanaticism prepared them for their subsequent career. Like an overwhelming torrent, they passed over the neighboring states, and in the short space of eighty years from the death of their prophet, had extended their dominion from Egypt to India, and from Lisbon to Samarcand. During this time nothing can be said of their culture and refinement. A fanatical desire of conquest prevailed. Gradually, however, by their intercourse with civilized nations, the Arabian conquerors were themselves subjected to the humanizing influence of letters, and, after 749, or during the reign of the Abassides, literature, arts, and sciences appeared, and were generously fostered under the splendid sway, first of Almansor (754–775), and afterwards of the celebrated Harun-al-Raschid (786–808). Learned men were now invited from many countries, and remunerated for their labors with

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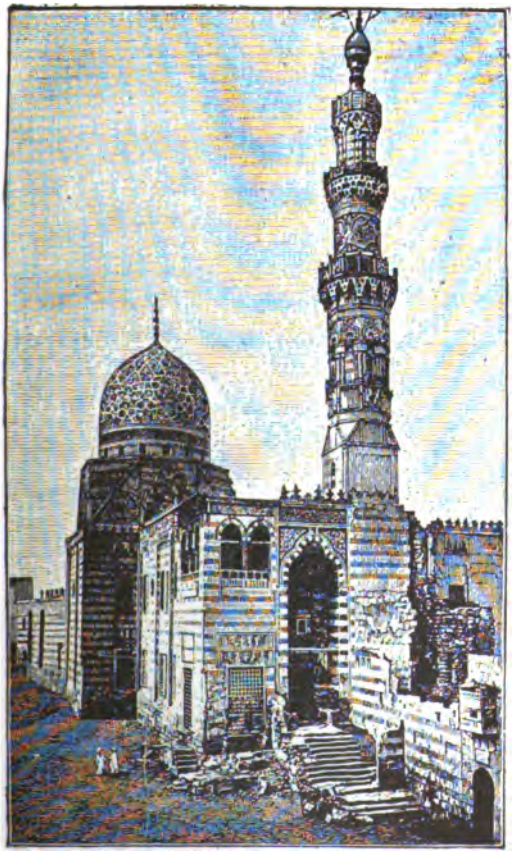

Arabian Architecture.—The Mosque of Kait Bey, Cairo. (From a Photograph by Frith.)

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princely munificence; the works of the best Greek, Syriac, and old Persian writers were translated into Arabic, and spread abroad in numerous copies. The Caliph Al Mamun, who reigned 813 to 833, offered to the Greek emperor five tons of gold and a perpetual treaty of peace, on condition that the philosopher Leo should be allowed for a time to give instruction to the former. There are few instances of such a price offered for lessons in philosophy. Under the sway of the same Al-Mamun, excellent schools were founded in Bagdad, Basra, Bokhara, and Kufa; while large libraries were collected at Alexandria, Bagdad, and Cairo. In Spain, the high school of Cordova rivalled the literary fame of Bagdad, and, generally, in the 10th c., the Arabs appeared everywhere as the preservers and distributers of knowledge. Pupils from France, and other European countries, then began to repair to Spain in great numbers to study mathematics and medicine under the Arabs. There were fourteen academies, with many preparatory and upper schools in Spain, and five very considerable public libraries; that of the Caliph Hakem, containing, as is said, more than 600,000 vols. This state of culture, when compared with that prevalent before Mohammed, shows a rapidity of progress in knowledge almost as remarkable as the career of Arabian conquest.

In geography, history, philosophy, medicine, physics, and mathematics, the Arabians rendered important services to science; and the Arabic words still employed in science—such as algebra, alcohol, azimuth, zenith, nadir, with many names of stars, etc.—remain as indications of their influence on the early intellectual culture of Europe. But geography owes most to them during the middle ages. In Africa and Asia, the boundaries of geographical science were extended, and the old Arab treatises on geography and works of travels in several countries by Abulfeda, Edrisi, Leo Africanus, Ibn Batuta, Ibn Foslan, Ibn Jobair, Albiruni the astronomer, and others, are still interesting and valuable.

History was also studiously cultivated. The oldest Arabic historian now known is Mohammed-al-Kelbi (d. 819). About the same period, however, flourished several other historians. After the dawn of the 10th c., history became a favorite study of the Arabs. The first who attempted a universal survey of the subject were Masudi, Tabari, Hamza of Ispahan, and Eutychius, the Christian Patriarch of Alexandria. Masudi's work is entitled *Meadows of Gold and Mines of Gems*. These were followed by Abulfaraj and George Elmakin (both Christians), Abulfeda, and others. Nuvairi wrote a *History of Sicily under the Government of the Arabs*. Various sections of Arabic histories relating to the Crusades have been translated into French. On the dominion of the Arabs in Spain, several works were written by Abul-Kasem of Cordova (d. 1139), Temini, and others. For extended notices the student of Arabic literature is referred to the translations by Quatremère and others. Von Hammer began a history, which comes down only to the 13th c. (7 vols., 1850–56). See Zenker's *Bibliotheca Orientalis*.

Arabian theology and jurisprudence are intimately con-

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nected and both founded on the Koran; but are not so simple and uniform as is generally supposed. Speculation began to prevail first during the Ommaiade dynasty, and the Aristotelian philosophy to be studied by the Arabs. As a consequence, the vague statements of the Koran were soon variously interpreted, and a host of sects gradually arose. See MOHAMMEDAN SECTS. Of these only four are regarded as orthodox, leaving not less than seventy-two heretical, whose discordant tenets are stated in the work of Sharistani (edited by Cureton, London, 1842). The four orthodox sects are: the Hanefites, who do not reject tradition, but subordinate it to rationalism; the Shafites, who entirely refuse the aids of reason and philosophy in their treatment of theology; the Kambalites and the Malechites, who allow speculation on points where there is no tradition. The collection of traditions known as the *Sunna* gives an account of the sayings and doings of Mohammed, and, though pedantic in its details, is in substance more valuable than the Koran. The interpretation of the Koran constitutes the principal part of education in theological jurisprudence. The most celebrated of the commentators are Samakhshari and Baidhawi. The conquest of Algiers has rendered the study of Arabic or Mohammedan law indispensable to the French. The result is, that several most important works on that subject have appeared of late from the Paris press, such as *Précis de Jurisprudence Musulmane, selon le Rite Maléchite par Khalil-Ibn-Ishak* (translated by Perron, Paris. 1848), and *Législation Musulmane Sunnite, Rite Hanéfi* (Paris, 1848).

Arabian philosophy, which was of Grecian origin, held the same relation to the Koran as the Scholasticism of the middle ages did to the Christian Scriptures—that is, it was regarded as the servant of faith. The chief study of the Arabs was the writings of Aristotle, who became known in Spain, and subsequently in all Western Europe, through translations from Arabic into Latin; though the Arabs themselves knew the Greek philosopher only in translations made during the time of the Abassides. Especial attention was paid to logic and metaphysics. The most distinguished of their philosophical writers are: Alkendi of Basra, about the beginning of the 9th c.; Alfarabi, who wrote a work on First Principles, 954; Avicenna (d. 1036), who combined the study of logic and metaphysics with that of medicine. and made considerable progress in chemistry, nosology, and medical botany; Ibn-Yahya, who acquired high reputation as an original thinker; Alghazali (d. 1111), who wrote a book entitled *The Destruction of all Idolatrous Philosophical Systems;* Abubekr-ibn-Tofail (d. 1190), who taught in his philosophical novel *Hai-ebn-Yokdan* (edited by Pococke, Oxford, 1671) the development of men from animals; and his pupil, Averrhoes, greatly esteemed as an expositor of Aristotle. For an account of these men and their systems, see *Sur les Écoles Philosophiques chez les Arabes*, etc., by Schmölders (Paris, 1842), and Ritter's *Ueber unsere Kenntniss der Arab. Philosophie* (Gött. 1844); also Renan's *Averroès et l'Averroisme* (1850).

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Many of these illustrious Arabian philosophers were also physicians. The great skill which the Arabs acquired in their knowledge of the uses and properties of medicinal herbs is traced by Humboldt to their geographical position. The s. part of Arabia 'is characterized by the highly developed vital force pervading vegetation, by which an abundance of aromatic and balsamic juices is yielded to man from various beneficial and deleterious substances. The attention of the people must early have been directed to the natural products of their native soil, and those brought as articles of commerce from the accessible coasts of Malabar, Ceylon, and Eastern Africa. Hence arose the wish to distinguish carefully from one another those precious articles of commerce, which were so important to medicine, manufacture, etc. . . . The science of medicine, considered as to its scientific development, is essentially a creation of the Arabs, to whom the oldest, and at the same time one of the richest, sources of knowledge—that of the Indian physicians—had been early opened. Chemical pharmacy (see ALCHEMY) was created by the Arabs, while to them are also due the first official prescriptions regarding the preparation and admixture of different remedial agents—the dispensing recipes of the present day. These were subsequently diffused over the s. of Europe by the School of Salerno' (Humboldt's *Cosmos*, vol. ii. p. 581, Bohn's translation). Pharmacy and *materia medica* naturally led to botany and chemistry. For three centuries—from the 8th to the 11th—a rich scientific culture prevailed. Schools of philosophy and medicine sprang up at Jondisahur, Bagdad, Ispahan, Firuzabad, Bokhara, Kufa, Basra, Alexandria, Cordova, etc. In all departments of medical science a great advance was made, except in anatomy. The reason of this exception lies in the fact that the Koran forbids the dissection of bodies. The most famous writers on medicine are Abarun, Alkendi, Avicenna (q.v.), who wrote the *Canon of Medicine*, for a long time the only handbook on the subject; Ali-ben-Abbas, Ishak-ben-Soleiman, Abulkasem, Averrhoes (q.v.), who wrote a complete system of medicine; Ali-ben-Isa, etc.

In mathematics, the Arabs made great advances by the introduction of the numerals and mode of notation now in use, of the sine instead of the chord (in trigonometry), and of a more extended application of algebra. Astronomy was zealously studied in the famous schools and observatories of Bagdad and Cordova. Alzahan wrote upon optics; Nassireddin translated the Elements of Euclid; Jeber-ben-Afla furnished a commentary on the trigonometry of Ptolemy, etc. The *Almagest* or System of Astronomy by Ptolemy, was translated into Arabic by Alhazi and Sergius as early as 812. In the 10th c., Albaten observed the advance of the line of the apsides in the earth's orbit; Mohammed-ben-Jeber-al-Batani, the obliquity of the ecliptic; Alpetragius wrote a theory of the planets; and Abul-Hassan-Ali, on astronomical instruments.

Beside these advances in the solid branches of knowledge, the genius of the Arabs continually flowered into

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poetry. Numerous poets sprang up in all lands where the children of the desert had carried their irresistible faith. Their verse, however, was not the rude, simple minstrelsy of a purely patriarchal people; it gradually allied itself to the prevailing culture, and took, especially in the golden epoch of Arabian civilization, a highly artistic form. Motenebbi, Abul-Ala, and others acquired great reputation for their delicate Idyls; Busiri, for his eulogy of Mohammed; Hamadâni, as the first to introduce novels in verse (of which he wrote 400 under the title of *Makâmât*), a style of literature brought to perfection by Hariri; Azzeddin, for his ingenious allegorical poem, 'The Birds and the Flowers.' Besides these, a singularly wild and fantastic prose literature made its appearance, in which the craving for the wonderful and gorgeous, so characteristic of the restless, adventure-loving Arabs, was richly gratified. Romances and legendary tales abounded. The most famous of these are: *The Arabian Nights' Entertainments* (q.v.), *The Exploits of Antar*, *The Exploits of the Champions*, and *The Exploits of the Hero*. In fact, with the exception of the drama, there was no sort of poetry which the Arabs did not attempt. The effect of this universality and richness in Arabic literature was, that it exercised a powerful influence on modern European poetry. The tales of fays, charms, sorceries, and the whole gorgeous machinery of enchantment passed into the poetry of the West. During the middle ages of European history, several of the most popular and widely spread books were of Arabic origin, such as *The Seven Wise Masters* and *The Fables of Bidpai*, though the Arabians themselves borrowed largely from the Persian stories and the Greek fables.

All this culture of the early ages of Mohammedanism presents a strong contrast to the ignorance which now prevails among the Arabs. The brutal fanaticism of the Turks nipped the blooming promise of the East; sunk in stupid indolence, the peoples await in apathetic resignation their deliverance and return to higher modes of life. Literature furnishes now nothing worthy of notice. Learning spends itself principally in commentaries and scholia, in scholastic discussions on the subject-matter of dogmatics and jurisprudence, and in tedious grammatical disquisitions concerning the old Arabic speech, generally acute and subtle, but always unprofitable and unenlivening. The swift and mobile genius of the East has departed and pedantic dulness has usurped its place. There are 'Dryasdusts' even in the desert. A few modern writers have attempted, with more or less success, to imitate European forms of thought and sentiment. Of these may be mentioned Michael Sabbagh of Syria (*La Colombe Messagère*, Arabic and French, Paris, 1805); the Sheik Refaa of Cairo (*The Broken Lyre*, Paris, 1827; *Manners and Customs of the Europeans*, Cairo, 1834; *Travels in France*, Cairo, 1825); and Nasif-Effendi, of Beirut, who wrote the critical observations in De Sacy's edition of Hariri (*Epistola Critica*, Leipsic, 1848).

The Arabic also possesses a Christian and Jewish literature, which, however, is chiefly ecclesiastical. Its principal

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ornaments are Eutychius, Elmakin, and Abulfaraj. Translations of the Old Test. were made not from the Hebrew, but from the Septuagint, or from Latin versions. In the middle ages, the Spanish Jews employed Arabic for their learned compositions; and several of the most important works of Moses Maimonides, etc., were originally written in that tongue.

The Arabic *language*, it has been remarked, is at once both *rich* and *poor*. It is necessarily destitute of innumerable words, describing those ideas and objects which only civilization can develop or produce; but, on the other hand, the rich and nimble fancy of the Arabians has multiplied, to an almost incredible extent, the synonyms of their desert-tongue, so that in some cases several hundreds of expressions are found for the same thing. The Arabic is distinguished among the Semitic family of languages, for its antiquity and soft flexible grace. It is divided into two dialects—northern and southern. The former, through the instrumentality of the Koran, became the predominant language of literature and commerce throughout the whole extent of the Arabian dominions; the latter, called Himyaric (q.v.), although in all probability the source of the Ethiopic language and writing, is known as yet only by a few inscriptions, etc. The earliest Arabic grammarian is Abul-Aswad-al-Duli, who lived under the fourth caliph, Ali. The first who reduced the prosody and metre of the Arabian poets to a system was Khalil-ben-Ahmed-al-Ferahidi of Basra. Al-Jauhari, who died 1009, drew up a dictionary of the pure Arabic speech, which he entitled *Al-Sihah* ('Purity'), and which is held in high estimation to this day. Mohammed-ben-Yakub-al-Firuzabadi, who died 1414, was the author of an Arabic Thesaurus, entitled *Al-Kamus* ('The Ocean'), the best lexicon in the language, and has consequently been translated into Persian and Turkish. Jordshani has explained, in alphabetical order, the meaning of the technical terms used in Arabic art and science. His work was published by Flügel (Leipsic, 1845), under the title of *Definitiones*. Meidani made a large collection of Arabic 'saws,' apothegms, etc., pub. by Freytag, Bonn, 1838. Through the conquests of the Arabs in Sicily and Spain, their language became known in Europe; but notwithstanding the numerous traces of its influence in various European tongues, it became forgotten after the expulsion of the Moors from Spain. The first European scholars who earnestly took up the subject were the Dutch, in the 17th c.; after them the Germans, French, and English. It is now, however, beginning to be considered a necessary part of a learned theological education. The modern Arabic of the inhabitants is substantially the same as that of the Koran, but the lapse of time has gradually introduced changes in the grammatical forms of the language as in other languages. Wright's *Arabic Grammar* (new edition) is one of the best extant: Lane's *Arabic-English Lexicon* is a standard work; and Badger's *English-Arabic Lexicon* (1881) is also excellent. The grammatical and lexicographical works of Caspari, Freytag, Fleischer, De Sacy, and Bocthor, are most important.

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Arabic Writing.—Like all Semitic writing, this proceeds from right to left. It is borrowed from the old Syriac, and was probably introduced into Arabia by Christian missionaries about the time of Mohammed. In its oldest form it is called Kufic, from the town of Kufa, on the Euphrates, where the transcription of the Koran was busily carried on. Its characters are rude and coarse, and it has particular symbols for only sixteen of the twenty-eight Arabic consonants. This writing, nevertheless, continued to be employed for 300 years, and for coins and inscriptions even later; but in the 10th c. it was displaced for common purposes by a current handwriting, the *Neskhi*, introduced by Ebn Mokla. This is the character still in use. In this the consonants which resemble each other are distinguished by points, and the vowels by strokes over and under the line.

ARABIAN NIGHTS' ENTERTAINMENTS: a collection of Oriental tales, first made known to Europe by Antony Galland, a French orientalist, under the title of *The Thousand and One Nights, Arabian Stories, Translated into French;* pub. Paris, 12 vols. 12mo, 1704–17, and received by many as the production of the genius of the translator himself, rather than the collection of *an unknown Arabian author*, as Galland had stated in his dedication. Oriental scholars did not hesitate at first to declare against their authenticity, and denounce them as forgeries. Having taken only an obscure place in the literature of the East, and their style unfitting them from being classed among models of eloquence or taste—having no object of a religious, moral, or philosophical kind in view, while the manners and customs delineated in them were different from all received ideas of those of the Moslem nations—their success took the critics by surprise. The work became highly esteemed by the public; it filled Europe with its fame; it had abundance of readers, and no lack of editors. Few books have been translated into so many different languages, and given delight to so large a number of readers. It may be said that, in these oriental tales, there has sprung up a new branch of literature, for their influence on the literature of the present day is easily discernible. Here are found, depicted with much simplicity and great effect, the scenes of the town-life of the Moslem. The prowess of the Arab knight, his passion for adventure, his dexterity, his love and his revenge, the craft of his wives, the hypocrisy of his priests, and the corruptibility of his judges, all are dramatically delineated—far more vividly represented, in fact, than is possible in a book of travels; while gilded palaces, charming women, lovely gardens, and exquisite repasts captivate the senses of the reader, and transport him to the land of wonder and enjoyment. Besides entertaining the mind with the kaleidoscopic wonders of a teeming and luxurious fancy, which is their most obvious merit, they present a treasure of instruction upon life in general, and oriental life in particular. And this is undeniable, notwithstanding the fact that the aspects of society they depict are far from high in the social scale, either as to civilization or morality. In them no story is to be found that will rank in morality with the story of

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Joseph and his brethren, simply because the Moslem faith will not admit of that, any more than the decline of Arab civilization at the time the tales must have been originally promulgated. Indeed, Galland, the first translator, having a conviction of a demoralizing tendency of this kind, avoided giving several objectionable parts of some of the stories. The thread of the narrative in these entertainments is generally simple and clear, often leading into the departments of fable, and occasionally into the regions of the supernatural and the domains of popular superstition. The tales, even when long, are not tiresome; for they consist of shorter stories branching off from the main one, or rather encased within it, the smaller within the larger, and perhaps a smaller within that, like the little boxes used by conjurors.

For many years all doubt as to the authenticity of *The Thousand and One Nights* has been dispelled. Several MS. copies have been found, and no less than four editions of the Arabic text have been published. A more thorough acquaintance with mediæval and modern Arab life has proved the genuineness of the stories, and the truthfulness of their general representation of the mind of the Moslem. In them there are evident signs of a declension from a refined and superior civilization; the marvellous and supernatural is predominant; despotism in all its forms is manifest; and a prevalent falsity and insincerity of character visible, not only in the narrative, but in the tone of common conversation, replete as it is with oaths and asseverations.

The origin of the work—where and by whom written—is still involved in mystery. According to some, the tales are susceptible of a threefold division. The most beautiful, and in fancy the richest, appear to have come from India, the cradle of story and fable; the tender, and often sentimental, love-tales seem of Persian origin; while the masterly pictures of life, and the witty anecdotes, claim to be the product of Arabia. Throughout, however, everything is conformable to the character and customs of the town population of Arabia, and to the Mohammedan faith. The Baron de Sacy, 1829, thus stated his opinion on these points. Speaking of the work he says: 'It appears to me that it was originally written in Syria, and in the vulgar dialect; that it was never completed by its author; that, subsequently, imitators endeavored to perfect the work, either by the insertion of novels already known, but which formed no part of the original collection, or by composing some themselves, with more or less talent, whence arise the great variations observable among the different MSS. of the collection; that the inserted tales were added at different periods, and perhaps in different countries, but chiefly in Egypt; and, lastly, that the only thing which can be affirmed, with much appearance of probability, in regard to the time when the work was composed, is, that it is not very old, as its language proves, but still that, when it was brought out, the use of tobacco and coffee was unknown, since no mention of either is made in the work.'

Galland's French edition was speedily translated into all the languages of Europe; edition following edition with

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great rapidity, some of them with enlargements, and others with modifications. A new English translation from the Arabic appeared in 1839 (new issue, edited by S. Lane Poole, 1882). It was the work of E. W. Lane, a gentleman whose long residence in Egypt enabled him to acquire so thorough a knowledge of the language, manners, and customs of the Egyptian Arabs, as furnished not only a superior version, but a series of notes embodying a portraiture of Egypto-Arabian life at once faithful and vivid. A complete translation by Payne was pub. by the Villon Society (9 vols. 1882–84); and in 1885 Captain Burton began to issue his complete translation (10 vols.).

The popularity of this wonderful book has given rise to hundreds of imitations. Among the best of the French are—*Les Mille et Un Jours*, *Mille et Une Quart d'Heures*, and the *Contes d'un Endormeur;* perhaps the best of the English imitations is the *Tales of the Genii*, by Sir Charles Morell; while the best of the German appears to be one from the Perso-Arabic, the *Faraj bâd el Shidda* (Joy after Sorrow), a popular work, and repeatedly published.

ARABIAN NUMERALS, or CIPHERS: the characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Properly they should be styled Hindu or Indian Numerals, for the Arabs borrowed them, along with the decimal system of notation, from the Hindus. According to one account, Gerbert (afterwards Sylvester II.) learned the use of them from the Moors in Spain in the 10th c.; others think it more probable that Leonardo of Pisa (see ALGEBRA) first introduced them from the East into Italy abt. 1202. Yet the use of them was long in making its way, and was not general before the invention of printing. Accounts continued to be kept in Roman numerals up to the 16th c. See NUMERALS: NUMERATION.

ARABIAN SEA, anciently *Mare Erythræum*, or the *Red Sea:* bay of the Indian Ocean, between India on the e. and Arabia on the w. Its northern boundary is Beloochistan; while its natural and convenient limit on the s. is a line drawn from Cape Comorin in Hindustan to Cape Guardafui in Africa, and thence continued along the coast to the Strait of Bab-el-Mandeb. In e. long. it extends from 43° 32′ at Cape Bab-el-Mandeb, to 77° 30′ at Cape Comorin; and in n. lat. from 8° 5′ at Cape Comorin, to abt. 26° at the s.w. point of Beloochistan. Including its two great arms, the Red Sea proper and the Persian Gulf, it stretches far both n. and w. By the former it is, since the opening of the Suez canal in 1869, connected with the Mediterranean Sea. In this last aspect the A. S. long occupied a most prominent place in the commerce of the world—a place which, after having lost it for more than 300 years through the doubling of the Cape of Good Hope in 1497, it has lately in a great measure regained, through the enterprise of English capitalists, the Egyptian government, and the perseverance of M. Lesseps.

In the history of navigation, also, the A. S. proper is specially entitled to notice. It was along its n. shores that Nearchus, admiral of Alexander of Macedon, conducted the first well-authenticated voyage, on a large scale, of explora-

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tion and discovery; and across it the trade-winds, blowing alternately from n.e. and s.w., were wont to waft the Greeks of Egypt, without either chart or compass, about the commencement of the Christian era. See SUEZ CANAL.

ARABIN, n. *ăr'ă-bĭn* [formed from *Arabic*]: the soluble gummy principle of gum arabic (q.v.); $C_{12}H_{22}O_{11}$, isomeric with cane-sugar; obtained pure by adding alcohol to a solution of gum-arabic in water, when the A. is precipitated in white flocculi.

ARABI PASHA: see EGYPT.

ARABLE, a. *ăr'ă-bl* [F. *arable*—from L. *arabilis*—from L. *aro;* Gr. *arŏō'*, I plow]: land that can be plowed or cultivated.

ARACAN, or ARRACAN, *ă'rā-kăn':* most n. division of British Burmah; bounded on the n. by Chittagong, on the e. by Ava, on the s. by Pegu, on the w. by the Bay of Bengal; n. lat. from 18° to 21° 33′, e. long. from 92° 10′ to 94° 50′. Its extreme length is 290 m.; and its breadth, from 90 m. at the n., gradually diminishes towards the s., so as to yield an average of little more than 45; 14,526 sq. miles. A range of mountains, nearly parallel with the line of coast, the highest point 7,000 ft. above the sea-level, separates A. from Pegu and Upper Burmah. The soil of the n. portion of A. is alluvial; but the country is hilly, difficult of access, and covered with forest. The province is divided into four districts—Akyab, Sandoway, Kyouk-Pyou, and North Aracan. The British conquest of the province has been highly beneficial in every way. Rice and salt are chief articles of exportation; the others are tobacco, sugar, wood, oil, betel-nuts, buffalo hides and horns, elephants' teeth, dried fish, and edible birds' nests. The imports consist of British woolens, muslins, cutlery, and glass. Pop. (1825–6) abt. 100,000; (1831) 173,000; (1839) 248,000; (1872) 483,363; (1881) 587,518; (1894) 671,899.

There have been various indications of volcanic action in A. In the islands of Ramree and Cheduba are springs of muddy water which emit bubbles of gas. Two severe earthquakes have taken place, 1763 and 1833—the latter having thrown up, in several places, muddy water of a sulphurous smell, and also, on one particular spot, vapor and flame to the height of several hundred feet. Of the mineral resources very little is known. Iron-ore has been found, but not in such quantity and quality as to come into profitable competition with British iron. Coal exists, understood to be good; but has not been extensively worked. There are no lakes in the province, nor are there any rivers of importance, though the Aeng, which appears to be the most available among them, is said to be navigable during spring-tides 45 m. from its mouth.

ARACAN, or ARRACAN, or MRO-HOUNG [Old Town]: city of British Burmah; formerly cap. of the prov. of A.; about 50 m. from the sea; lat. 20° 42′ n., long. 93° 24′ e. Lying in a swampy valley which, on almost every side, is confined by hills, A. is subject to febrile disease in all its forms. Previous to the first Burmese war—the occasion which

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brought it under British dominion—it is said to have contained 18,000 houses; but in 1835, after it had ceased to be the seat of government, the population had sunk to 8,000. In 1877, the inhabitants of the town hardly exceeded 2,000. The most striking memorial of antiquity is its dilapidated fort, consisting of three concentric walls such as only a powerful state could have constructed. Beyond the limits, too, of this citadel, the town, as a whole, appears to have been surrounded by a circumvallation 9 m. in length, composed partly of steep and rugged eminences and partly of artificial works. These defenses, which are believed to be several centuries old, the British carried by assault, 1825, April 1.

ARACARI, *ă-rä-sä'rĭ*, or ARICARI (*Pteroglossus*): genus of birds closely allied to the Toucans (see TOUCAN), and differing from them chiefly in the somewhat smaller bill, which is not so thick as the head. They are generally also of smaller size, and the prevailing color of their plumage is green, often varied with brilliant red and yellow. Like the Toucans, they are natives of the warm parts of S. America.

ARA'CEÆ: see ARUM.

ARACHIS, *ăr'ă-kĭs:* genus of plants of the natural order *Leguminosæ*, sub-order *Papilionaceæ*, natives of the warm parts of America, of which the principal and, until recently, the only known species was the *A. hypogæa*, sometimes called the underground kidney-bean, and more frequently the ground-nut, or peanut. It also receives the names of earth-nut and mandubi. It is an annual plant, with hairy pinnate leaves, which have four leaflets. The flowers are yellow, the standard veined with red. After flowering, the flower-stalks elongate and bend toward the earth, into which the pods penetaate, ripening underground. The seeds are in some countries a principal article of food; but the importance of the plant is due chiefly to the fixed oil in the seeds, similar to olive oil or almond oil. It is cultivated in all warm regions of the world. The root is used sometimes as a substitute for licorice. See PEANUT.

ARACHNIDA, *ă-räk'nĭ-dä*, or ARACHNIDES: sub-class of *Tracheate Arthropoda* (q.v. under ARTICULATA), including scorpions, spiders, mites, etc., and first separated by Lamarck from the *Insecta* of Linnæus. The body is usually divided into cephalo-thorax and abdomen, the latter destitute of appendages, the former possessing six pairs, of which the posterior four pairs are walking limbs, thus furnishing a ready means of distinction from insecta, which have three pairs only. The two anterior pairs known as cheliceræ and pedipalpi are of various forms, the former usually chelate or sub-chelate; the latter chelate, ambulatory, or antenniform. Respiration is effected by means of tracheal tubes, or by pouches—the so-called respiratory sacs.

Those A. with segmented abdomen are termed *Arthrogastra*, or *Pedipalpi;* families five of which *Scorpio, Thelyphonus, Chelifer, Galeodes*, and *Phalangium* are types. These show a distinct gradation to true spiders or *Araneina*, which are easily recognized by their unsegmented abdomen usually furnished with spinning-glands, opening by four to

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six posterior papillæ, and by their sub-chelate cheliceræ and ambulatory pedipalpi. The mites and ticks (*Acarina*) have the unsegmented abdomen, continuous with the thorax, and the cheliceræ and pedipalpi are modified into a sucking or piercing apparatus. The *Linguatulida* (*Pentastomum*), the *Tardigrada*, and the *Pycnogonida*, have usually been reckoned as highly modified A., somewhat akin to the *Acarina;* the, most recent anatomists, however, tend to remove them from the A. altogether. On the other hand, it has lately been clearly shown that the Silurian *Eurypterida*, and the ancient, but still persistent *Limulus* (see KING-CRAB), must be reckoned rather as A. than as Crustaceans, and thus the two great divisions of the Arthropoda, the Tracheata and the Branchiata, appear to have diverged in palæozoic times. See ACARUS: MITE: SCORPION: SPIDER: TICK: also Huxley's *Anat. of Invertebrated Animals*, Balfour's *Comparative Embryology*, and Cambridge's memoir in *Encyc. Britannica*, 9th ed.

ARACHNOID, n. *ă-răk'noyd* [Gr. *arachnē*, a spider; *eidos*, form]: in *anat.*, the serous membrane covering the brain, and lying between the *pia-mater* and *dura-mater:* ADJ. in *bot.*, having fine hairs so entangled as to resemble a cobweb; spider-web-like. ARACHNIDA, n. plu. *ă-răk'nĭ-dă*, or ARACH'NIDANS, n. plu. *-nĭd-ănz* [see IDÆ, postfix]: a class of articulata, comprising spiders, mites, and scorpions. ARACHNITIS, n. *ăr'ăk-nī'tĭs*, inflammation of the arachnoid membrane.

ARACHNOID MEMBRANE, *ă-răk'noid:* one of the three coverings of the brain and spinal cord; a thin glistening, serous membrane, which by its parietal layer adheres inseparably to the dura-mater on its outer side, and more loosely to the pia-mater which is between it and the brain substance. Between the pia mater and the A. M. in some situations there are considerable intervals (sub-arachnoid spaces); they are filled with a fluid named cerebro-spinal, the presence of which is necessary to the proper action of the nervous centres. See CEREBRO-SPINAL FLUID: PIA-MATER.

ARAD, *ŏr'ŏd:* t. in the dist. of A. in Upper Hungary; on the right bank of the Marosh, an affluent of the Theiss; and is also styled Old A. to distinguish it from New A., on the opposite side of the river. A. carries on a large trade in corn, tobacco, etc., and was at one time the greatest cattle-market in Hungary, and is even yet inferior only to Pesth and Debreczin. During the 17th c., it was often captured, and at last destroyed by the Turks. Its new fortifications, erected 1763, made A an important position in the revolutionary war of 1849, when it was occupied for a considerable time by the Austrian general Berger, who capitulated here, July, 1849. From A. Kossuth issued his proclamation, 1849, Aug. 11, in which he expressed in impassioned terms his despair of the Hungarian cause for the present. After the catastrophe of Világos, Aug. 17, A. was surrendered to the Russians through the treachery of Görgey. Pop. (1891) 47,607, including many Jews who are very wealthy.

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NEW A., a t. in the Banat of Temesvar, contains (1880) 5,141 inhabitants, including many Germans, who are the principal persons in the place.—The dist. or prov. of A. has 1,700 sq. m. The. e dist. is occupied by a branch-chain of the Carpathian Mts., which contain marble quarries, and mines of copper and iron; the w. is level, and produces wheat, maize, and several varieties of wine, as well as abundance of fruits. The inhabitants are chiefly Wallachians. Pop. of prov. (1894) 304,813.

ARÆOMETER: see AREOMETER.

ARÆOSTYLE, n. *ă-rē'ō-stīl* [L. *areostylus:* Gr. *araios*, thin, narrow, with intervals; *stulos*, a pillar]: in *arch.*, a kind of intercolumniation in which the pillars are so wide apart that the intermediate spaces are each upwards of three diameters of the column. This constitutes one of the five kinds of intercolumniation described by Vitruvius: ADJ., pertaining to.

ARÆOSYSTYLE, n. *ā'rē-o-sĭs'tĭl* [Gr. *araios*, thin, narrow; *sustulos*, with columns standing close]: an arrangement in which columns are coupled; for example, in the w. front of St. Paul's Cathedral, London.

ARAFAT, *ä'rä-fät'*, MOUNT, or *Jebel-er-'rahme* ['Mountain of Mercy']: a granite hill abt. 15 m. s.e. of Mecca; believed by the Mohammedans to be the spot where Adam, conducted by the angel Gabriel, met again his wife Eve, after a punitive separation of 200 years, on account of their disobedience in Paradise. It is not above 200 ft. high, but its circuit is a mile and a half. Its importance since the time of Mohammed arises from its being the scene of a yearly procession of the faithful who visit Mecca. Burckhardt, who witnessed the procession of 1814, states that not less than 70,000 people were present, and that at least forty different languages were spoken. The principal part of the religious ceremony of this pilgrimage is a sermon, the hearing of which entitles all to the name and privileges of a Hadji.

ARAGO, *ăr'a·go*, *ä-rä-gō'*, or *ä-rä'go*, DOMINIQUE: 1786, Feb. 26—1853, Oct. 3; b. Estagel near Perpignan, dept. of the E. Pyrenees; celebrated French astronomer and natural philosopher. At the age of 17, he entered the Polytechnic School at Paris, where the spirit, promptitude, and vivid intelligence of his answers to the questions of Legendre excited admiration. In 1804, he became sec. to the observatory at Paris. Two years afterwards, he was engaged, with Biot and others, by the French government, to carry out the measurement of an arc of the meridian, which had been commenced by Delambre and Méchain. A. and Biot had to extend it from Barcelona to the Balearic Isles. The two *savans* established themselves on the summit of Mount Galatza, one of the highest of the Catalonian branch of the E. Pyrenees. Here they lived for many months, communicating by signals with their Spanish collaborateurs, across the Mediterranean in the little isle of Iviça, though many a night the furious tempests destroyed their hut together with the labors of weeks. Visitors they had none, except two

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Carthusian monks, who were wont to come up and spend a portion of the evening in converse with them. Before A. had completed his calculations, Biot had returned to France, and war had broken out between the two nations. A was now held to be a spy; his signals were interrupted; and with great difficulty he succeeded in making his escape to Majorca, where he voluntarily imprisoned himself in the citadel of Belver, near Palma. At last he obtained his liberty on condition of proceeding to Algiers, which he did; but was captured, on his return to France, by a Spanish cruiser, and sent to the hulks at Palamos. He was, however, liberated after a time, and sailed once more for France; but almost as he was entering the port of Marseilles, a tempest arose which drove the vessel across the Mediterranean all the way to Algiers. The former dey, to whose demands he had owed his liberation from the hulks, was dead; his successor, a ferocious tyrant, placed him on his list of slaves, and intended to employ him as interpreter. After some time, he was released at the request of the French consul, and, narrowly escaping another capture by an English frigate, finally found his way to Marseilles 1809, July. As a reward for his suffering in the cause of science, the Acad. of Sciences suspended its standing rules in his favor; and though only 23 years of age, he was elected member in the place of Lalande, who had just died, and was appointed Professor of Analytical Mathematics in the Polytechnic School. Afterwards, his attention was given more to astronomy, magnetism, galvanism, and the polarization of light. In 1811, he read a paper to the Academy, which may be considered the foundation of 'chromatic polarization.' In 1812, he commenced his extraordinary course of lectures on astronomy, etc., which fascinated all Paris—the savans, by their scientific rigor and solidity; the many, by their brilliancy of style. In 1816, with Gay Lussac, A. established the *Annales de Chimie et de Physique*, and confirmed the truth of the undulatory theory of light. In the same year he visited England for the first time, and made the acquaintance of various persons distinguished in science, especially Dr. Thomas Young. In 1818, appeared his *Recueil d'Observations géodésiques, astronomiques et physiques.* In 1820, he turned his facile and inventive genius into a new channel, and made several important discoveries in electro-magnetism. Oersted had shown that a magnetic needle was deflected by a voltaic current passing along a wire. A. pursued the investigation, and found that not only a magnetic needle, but even non-magnetic substances, such as rods of iron or steel, became subject to deflection also, exhibiting during the action of the voltaic current a positive magnetic power, which, however, ceased with the cessation of the current. Some time after, he demonstrated that a bar of copper, and other non-magnetic metals, when moved circularly, exert a noticeable influence on the magnetic needle. For this discovery of the development of magnetism by rotation, he obtained, in 1825, the Copley Medal of the Royal Society of London; and in 1834, when he again visited Great Britain, especial honors

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were paid to him by the friends of science in Edinburgh and Glasgow. Four years previous to this second visit to Great Britain, he had received the honor he most coveted—that of being made Perpetual Sec. of the Acad. It was while holding this office that he wrote his famous *éloges* of deceased members, the beauty of which has given him so high a place among French prose-writers. As a politician, also, his career was remarkable. He was a keen republican, and was prominent in the July revolution (1830). In the following year he was elected by Perpignan as a member of the chamber of deputies, where he occupied a position on the extreme left. In the February revolution of 1848, he was chosen a member of the provisional government, and appointed minister of war and marine. In this position he resisted the proposed measures of the socialist party, and advocated the constitution of the United States as the beau-ideal of democracy. His popularity in his own province was the means of preventing the discontented population of the E. Pyrenees from proceeding to lawless and violent measures. On the question of the presidency, A. opposed Louis Napoleon, declared himself against the policy of the new ministry, and refused to take the oath of allegiance after the *coup d'état* of 1851. Napoleon, however, made a special exception in his favor, and allowed him to retain the directorship of the observatory. His works were edited by Barral (17 vols., 1854–62), and a statue of him was erected at Perpignan in 1879. See Audiganne's *A., son génie et son influence* (2d ed. 1869).

ARAGO, ÉTIENNE: archivist in the *Ecole des Beaux Arts*: 1802, Feb. 9—1892, Mar. 6: brother of Dominique. He held an appointment under the provisional government as director-general of the post-office, in which he showed great vigor, promptitude, and sagacity, and achieved several postal reforms; was elected member of the national assembly; was compromised by the insurrection in June, and sentenced to exile for life. In 1859, he returned to France; and at the time of the Franco-Prussian war was mayor of Paris, resigning, 1870, November.

ARAGO, JACQUES ÉTIENNE VICTOR: 1790–1855, Jan. 1; brother of Dominique, the great savant. In 1817, he accompanied the expedition under Freycinet in a voyage round the world. Afterwards, at Bordeaux and at Toulouse, he was engaged in several branches of light literature, industriously writing, in company with other scribes, a multitude of vaudevilles, besides publishing several poems and romances. In 1835, he undertook the management of the theatre at Rouen; but having become afflicted with blindness, he was compelled to resign this post in 1837. His early voyage round the world was the occasion of two very pleasant books of travel: *Promenade autour du Monde* (Paris, 1838); *Souvenir d'un aveugle, Voyage autour du Monde* (Paris, 1838). In 1849, though deprived of sight, he formed a company of speculators, placed himself at the head of it, and departed for California, to search for gold on a large scale. His companions mutinied, and left him, deserted

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and disappointed, at Valparaiso. On his return, he published his painful experiences, under the title, *Voyage d'un aveugle en Californie et dans les Regions auriferes* (Paris, 1851).

ARAGO, JEAN: 1789–1836; brother of Dominique: was general of the republican army in Mexico, and wrote, in Spanish, a history of Mexico.

ARAGON, *ăr'a-gon:* anciently a kingdom, then a prov. in the n.e. of Spain; bet 40° 2′ and 42° 54′ n. lat., and long. 2° 10′ w. and 0° 45′ e.; greatest length from n. to s., 190 m.; breadth, 130 m.; 17,900 sq. miles. It is bounded, n. by the Pyrenees, separating it from France; w., by Navarre, and Old and New Castile; s., by Valencia, and part of New Castile; and e., by Catalonia, and part of Valencia. The river Ebro, which descends from the n. heights of Old Castile, flows through the middle of A., receiving numerous tributaries both from the lofty regions of the Pyrenees and from the Sierras in the s.; of the former, the principal are: the Noguera, which forms the boundary line between A. and Catalonia, the Essera, and the Gallega; of the latter, the principal are: the Guadalope, the San Martin, and the Salon. The prov. is naturally divided into the level country, along the Ebro, and the n. mountainous district of Upper Aragon. The central plain is sterile, poorly supplied with water, and intersected by deep ravines (*barancos*). Agriculture is here confined to the raising of maize, vines, and olives; but on the sides of the Ebro, where water abounds, rice and other grains are abundantly produced; and in the valleys of upper A., the most beautiful and fertile of all the Pyrenean valleys, we find a splendid vegetation, and a soil that enables the inhabitants, in spite of the wretchedness of their agriculture, to grow considerable wheat, rye, maize, barley, etc. The climate of the prov. is various; comparatively cool in the mountain-districts, but often very sultry on the plains. Spurs of the Pyrenees strike down far into the prov., and between these ridges the rich valleys lie, some of them upwards of 20 m. long. The slopes of the hills are clothed with forests of oak, beech, and pine, and the felled timber is floated down the rivers into the Ebro, and thence down to Tortosa at its mouth. The minerals of the prov. are copper, lead, iron, salt, alum, saltpetre, coal, and amber. The manufactures are inconsiderable.

A., peopled by a brave, active, enduring, but obstinate, race, has frequently been the arena of sanguinary warfare. It early became a Roman prov.; and, on the fall of the empire, passed into the hands of the West-Goths, but was conquered by the Moors in the beginning of the 8th c. The rulers of A., after it had been recovered from the Moors, and united with Catalonia (1137), became powerful; obtained possession of the Balearic Isles in 1213; of Sicily in 1282, of Sardinia in 1326, and of Naples in 1440. By the marriage of Ferdinand with Isabella, heiress of Castile, in 1469, the two states of A. and Castile were united, and formed the foundation of the great Spanish monarchy. After Ferdinand's death in 1516, the union of the states was

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made permanent. In the war with the French, 1808–9, Saragossa, the cap. of A., was remarkable for its heroic defense under Palafox; and in recent Spanish wars, the people of A. have displayed the same courage which marked their conduct on that memorable occasion. Upper A. was on the side of the queen; but Lower A. generally adhered to the party of Don Carlos. The prov. is now divided into three depts.—Saragossa, Teruel, and Huesca. The chief towns are Saragossa, Calatayud, Huesca, and Teruel. See SARAGOSSA, etc. Pop. of A. (1877) 894,727.; (1893) 928,718.

ARAGONA, *â-râ-gō'nâ:* t. of Sicily, 8 m. n.n.e. from Girgenti. It is a poor town, and stands in the midst of bare green downs; but the hills above it are clothed with pines, cypresses, olives, almonds, and carobs. The only object of interest is the old castle of the princes of Aragona, a huge building, in the Renaissance style, which has fallen much into decay. Pop. 10,000.

ARAGONITE: see ARRAGONITE.

ARAGUATO, *âr·â-gwâ'tō* (*Mycetes ursinus*): the largest known species of new world monkeys. Its discordant yells may be heard at a mile's distance.

ARAGUAY, *â·râ-gwī':* large river of Brazil, rising in s. lat. 18° 10′ and w. long. 51° 30′. Like most of the considerable rivers of the country, it flows towards the n. After a course of about 1,000 m. to San Joao, it there joins the Tocantins, which, after a n. course of 300 m. more, mingles its estuary with that of the Amazon round the Isle of Marajo. Like most of the rivers in this part of Brazil, the A. is of difficult navigation, frequently interrupted by rapids.

ARAISE, v. *ă-rāz'* [AS. *a*, and *raise*]: in *OE.*, to raise.

ARAL, *ăr'al*, LAKE: second in size only to the Caspian Sea, in the steppes of Asia; separated from the Caspian by the plateau of Ust-Urt. It lies wholly within the limits of Russian Central Asia, between 43° 42′ and 46° 44′ n. lat., and 58° 18′ and 61° 46′ e. long. It is fed by the river Sir (the ancient Jaxartes) on the n.e. side, and the Amu (or ancient Oxus) on the s.e. It is shallow, and has no outlet. Its level is 117 ft. above that of the Caspian, and 33 ft. above that of the Black Sea. Like other lakes drained only by evaporation, it is brackish. Owing to the shallowness of its waters, navigation is difficult; but Russian steamers have been launched upon it, and took part in the operations against Khiva in 1873, June. The history of the Sea of Aral is very remarkable. Sir Henry Rawlinson and Col. Yule have recently collected references made to it in Greek, Latin, Arabic, and Persian writers, and have established the fact that its present area has been dry land twice within historical times—the Jaxartes and the Oxus then running s. of the Sea of Aral to the Caspian. This was the case during the Greco-Roman period, and again during the 13th and 14th centuries. The Russian government has undertaken the restoration of the Oxus to its old bed.—See *Proceedings of Royal Geographical Society*, vol. xi., vol. xvi., and vol. i. (new series, 1879); also *The Shores of Lake Aral*, by Major Wood (Lond. 1876).

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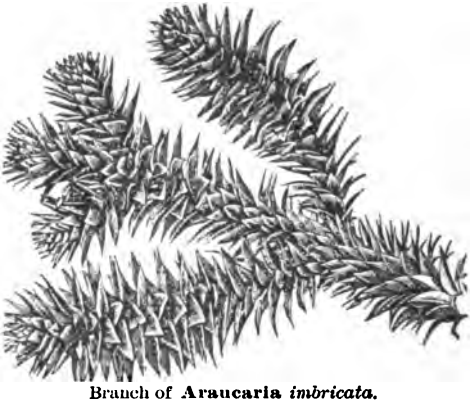

Branch of **Araucaria** *imbricata.*

Arcade, Romsey Church, Hampshire.

Arch of Titus.

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ARALIA, *ā-rā'li-ā:* genus of plants, type of the natural order *Araliaceæ*. This order is dicotyledonous or exogenous, and consists of trees, shrubs, and herbaceous plants, resembling the *Umbelliferæ* (q.v.) both in their general habit and in their botanical characters, but differing essentially in the fruit, which is not *didymous* or formed of two separable carpels as in the *Umbelliferæ*. The fruit of the Araliaceæ consists of several one-seeded cells, often succulent. The order contains about 160 known species, natives of tropical, temperate, and cold climates, generally possessing stimulant and aromatic properties. Poisonous qualities are not developed as in the *Umbelliferæ*. The herbage of many species affords good food for cattle, and some are used for human food. The genus Aralia contains a considerable number of species —trees, shrubs, and herbaceous plants. It has a succulent fruit, with 5 or 10 cells, crowned with the styles. *A. nudicaulis* is a native of the United States, a species of humble growth, having a solitary radical leaf with a trifid stalk and ovate serrated segments; the scape is shorter than the leaf. The root is said to be equal in value to sarsaparilla as an alterative and tonic. *A. racemosa*, *A. spinosa*, and *A. hispida*, also natives of N. America, produce an aromatic gum resin. *A. spinosa* is a stimulant diaphoretic. The berries, infused in wine or spirits, are employed as a cure for rheumatism. It is sometimes called Toothache-tree: it also bears the name of Angelica-tree. It is a native of moist woods in Virginia and Carolina, growing to a height of 10 or 12 ft., with a single stem, spreading head, doubly and trebly pinnate leaves and ovate leaflets, and is very ornamental in a lawn. *A. polaris*, found in the s. island of New Zealand, and in the greatest abundance and luxuriance in Lord Auckland's Islands, is described by Dr. Hooker as a 'very magnificent plant,' a herbaceous perennial, 4–5 ft. high, with large orbicular masses of green foliage and waxy flowers, presenting a very striking appearance. *A. edulis*, now called *Dimorphanthus edulis*, is employed in China as a sudorific. Its shoots are very delicate and pleasant when boiled; and the roots, which have an agreeable aromatic flavor, are used by the Japanese as carrots or parsnips are in Europe. Aralias abound in the warm valleys of the Himalaya. The natives collect the leaves of many as fodder for cattle, for which purpose they are of great value in a country where grass for pasture is scarce; but the use of this food gives a peculiar taste to the butter. Chinese rice paper has been ascertained to be cut from cylinders of the pith of an Aralia. Ginseng (q.v.), the root of a species of Panax, is one of the most important products of the order *Araliaceæ*. The astringent roots of *Gunnera scabra*, or Panke, are used in tanning, but its fleshy leaf-stalks are eaten like those of rhubarb. It has been seen on the sandstone cliffs of Chiloe with leaves nearly 8 ft. in diameter.—*A. nudicaulis* is known as Wild Sarsaparilla see SARSAPARILLA); and *A. spinosa*, the Angelica-Tree, is known as Hercules Club, having thick branchlets. Our native Ginseng (q.v.), and Dwarf Ginseng (*A. trifolia*), with deep globular tuber, common at the north, belong here.

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ARALIACEÆ, n. plu. *ă-rā'lĭ-ā'se-ē* [*aralĭă*, an American word]: the ivy family. ARALIA, n. plu. *ā-rā'lĭ-ā*, a genus of the above, one species of which has fragrant and aromatic roots, which are used in America as a substitute for sarsaparilla. ARALIACEOUS, a. *ăr-āl'i-ā'shŭs*, pertaining to the Aralia.

ARALO-CASPIAN, a. *ă-rā'lō-kăs'pĭ-ăn*, or *ā'răl-ō-*: a term applied to the extensive basin or depressed area occupied by the Aral and Caspian seas and surrounding districts of country; in *geol.*, applied to the limestone and associated sandy beds, of brackish-water origin, which have been traced over much more than the area indicated.

ARAM, *ā'răm*, EU'GENE: 1704–59; b. Ramsgill, Yorkshire. His father was a gardener, and could afford to keep A. at school only for a short time; but even while assisting his father, he contrived to gratify his passion for learning. At an early period of his life he married, and became a schoolmaster, first in Netherdale, and afterwards at Knaresborough, where he resided till 1745. In the town of Knaresborough lived one Daniel Clarke, a shoemaker, and an intimate acquaintance of A.'s. On one occasion Clarke happened to purchase a quantity of valuable goods, which he easily obtained on credit; but to the surprise of everybody, he soon after disappeared, and no trace of him could be discovered. Suspicion lighted upon A., not as Clarke's murderer, but as his confederate in swindling the public. His garden was searched, and in it was found a portion of the goods which Clarke had purchased. A. was arrested and tried, but acquitted for want of evidence. He now left his wife at Knaresborough, and went to London, and other parts of England, in his capacity of schoolmaster; and in spite of his wandering life, contrived to acquire a knowledge of botany, heraldry, Chaldee, Arabic, Welsh, and Irish, and was planning a great etymological work, to be entitled 'A Comparative Lexicon of the English, Latin, Greek, Hebrew, and Celtic Languages,' when he was suddenly dragged away from his ushership of Lynn Academy, in Norfolk, and committed to prison on a charge of murder.

In 1759, a skeleton was dug up near Knaresborough, which the inhabitants suspected to be that of Clarke, for they had now come to the conclusion that the unfortunate man had met with foul play, especially as A.'s wife had, on several occasions, made strange statements to the effect that her husband and a man named Houseman knew more of Clarke's disappearance than they chose to admit. Houseman was now confronted with a bone of the skeleton which had been discovered. He very emphatically denied that it was Clarke's. People naturally wondered how he *could* be so positive, the bones of skeletons being, to the uneducated eye, similar in appearance. They became convinced that if the skeleton was not Clarke's, Houseman must know where the latter was. At last he confessed that he had been a spectator of the murder of Clarke by A. and one Terry. He named the place where the body had been hidden. It was searched, the buried skeleton was dug up, and

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A. was tried at York, for the murder of Clarke, 1759, Aug. 3. What has given extraordinary *éclat* to this trial is the fact that A. conducted his own defense. He attacked, with great acumen, plausibility, and curious erudition, the doctrine of circumstantial evidence; but to no effect, for a verdict of guilty was returned, and he was condemned to suffer death three days afterwards. In the interval, he confessed his guilt to the clergymen who attended him. While in the condemned cell, he wrote a defense of suicide; but failed in a practical illustration of the doctrine, which he forthwith attempted.

ARAMÆ'A: the whole country to the n.e. of Palestine, with boundaries, not rigorously defined, as follows: n., by Mount Taurus; e., by the Tigris; s., by Arabia; and w., by Arabia, Phœnicia, and Lebanon. It comprised the countries known to the Greeks by the various names of Syria, Babylonia, and Mesopotamia. *The Aramaic language*, a branch of the Semitic, was common to the whole country, and was divided into two principal dialects—the west Aramaic or Syriac, and the east Aramaic, or, as it is improperly termed, the Chaldee. The former was that spoken almost universally in Palestine in the time of Christ. Ever since the Babylonian captivity, the pure Hebrew, in which the whole of the Old Testament, with the exception of a few chapters in Daniel and Ezra, had been written, had gradually given place to the Aramaic. The Aramaic version of the Bible was that used in Christ's time, who quotes from it, and not from the original Hebrew; as, for instance, the beginning of Psalm xxii. repeated on the Cross. The Talmud, especially the Babylonian, has a large admixture of Aramaic elements. The Aramaic dialect is, in general, the harshest, poorest, and least elaborate of all the Semitic languages, and has now almost entirely died out, and given place to the Arabic and Persian. Indeed, it is found living only among some tribes in remote districts of the mountains of Kurdistan, and in two or three villages in Syria; yet it is considered highly probable that it is the root of the whole cluster of Semitic tongues.

ARAMAIC, a. *ăr'ă-mā'ĭk* [from *Aram*, a son of Shem, whose earliest descendants are supposed to have inhabited the upper basin of the Tigris]: a name applied to the Syro-Chaldean language—a branch or dialect of the great Semitic family of languages. ARAMEAN, or ARAMÆAN, a. *ăr'ă-mē'ăn*, pertaining to the Syrians and Chaldeans or their language.

ARANDA, *ä-rän'dä*, PEDRO PABLO ABARCA DE BOLEA, Count of: 1718–99; of a distinguished Aragonese family: entered at first on a military career; but having evinced a remarkable spirit of observation, he was appointed by Charles III. ambassador to the court of Augustus III., king of Poland; which post he filled for seven years. After his return, he was appointed capt.-gen. of Valencia, and in 1766 recalled to Madrid on account of its disturbed state, and the presidency of the council of Castile was bestowed on him. A. not only soon restored order in the capital, but

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limited the power of the Inquisition, procured the expulsion of the Jesuits from Spain, and carried the salutary terror of government into the recesses of the Sierra Morena, then infested by hordes of ferocious banditti. Like many other reformers, he was not able fully to carry out his liberal intentions. In 1773, he was removed from his high position through the influence of the clergy, the Dominican monks especially, and sent as ambassador to France. Grimaldi succeeded him in his office, and after him Count Florida Blanca; but when the latter lost his office in consequence of court intrigues, A. returned to his position; soon, however, to lose it again through the agency of Godoy, Duke of Alcudia, the queen's favorite. He, however, remained president of the council of state, which he had organized; but upon his expressing his views regarding the war with France, he was banished to his native province of Aragon, where he died in 1799.

ARANEINA: see under ARANEOUS.

ARANEOUS, a. *ă-rā'nē-ŭs* [L. *arāneă*, a spider or cobweb]: resembling a cobweb. ARANEINA, n. *a-rā-nē-i na* the order of the spiders. ARANEIFORM, a. *ăr'a-nē'i-fawrm*, shaped like a spider (q.v.).

ARANGOES, n. pl. *ă-răn'gōz:* pierced beads of various forms made of rough carnelian, formerly imported from Bombay to be re-exported to Africa in the slave-trade.

ARANJUEZ, *ȧ-rȧn-hwĕth'* [a corruption of the Latin *Ara-Jovis*, altar of Jupiter]: t. in the prov. of Madrid, Spain; on the left bank of the Tagus, 28 m. s.s.e. from Madrid, in a beautifully wooded valley; connected with the Spanish metropolis by a railway. The town is built in the Dutch style and has broad and regular streets intersecting each other at right angles. It is famed for its palace and gardens. The palace was long a favorite resort in spring of the royal family, during which period A. occasionally reckoned as many as 20,000 inhabitants; the gardens were laid out by Philip II., who built a palace also, for there was only a shooting villa here during his father's time, but a fire destroyed a portion of it, and more was taken down by Philip V., who reconstructed the edifice in French style. The present château was completed by Charles IV. On account of its gardens, the natives call A. 'the metropolis of Flora.' These gardens are interspersed with numerous summer-houses, the most celebrated of which is the *Casa del Labrador*, or Laborer's Cottage; but their most splendid ornament are the great elm trees brought from England by Philip II., which thrive magnificently. They radiate out from a central plot in 12 distinct rows. A. is known historically for the treaty of alliance concluded here between France and Spain 1772, Apr. 12, and as the scene of the abdication of Charles IV. 1808, Mar. 18. Pop. 8,154.

ARANY, *ŏr'rŏñ*, JANOS: 1817, Mar. 2—1882, Oct. 22; b. Nagy-Szalonta: next to Petöfi the most distinguished of modern Hungarian poets. His father was a poor peasant, who spared no pains to get him into the church. In 1832, he entered the college at Debreczin, where he distinguished

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himself by his diligence; but unable to restrain his love of adventure, he joined, 1836, a company of strolling players, with whom he travelled about for several months, till, driven by necessity and an upbraiding conscience, he hurried home to do what he could for the support of a now blind and aged parent. At Szalonta he worked as a teacher of Latin and as a notary. When the Kisfaludy Soc. of Pesth offered a prize for the best humorous poem, A. sent in anonymously his *Az elveszett Alkotmány* (The Lost Constitution of the Past). He was successful. Thus emboldened, he ventured, 1847, to forward to the same soc. the first part of a trilogy, *Toldi*. Struck by the beauty of this purely national effort, the members published it at their own expense, and again rewarded the author. A. soon became a popular favorite, even in the lowest ranks of the community. In 1848, appeared his *Murány Ostroma* (Conquest of Murány), which received less attention owing to the political excitement of the time. The poet himself took a slight part in the revolution, but after the dismal termination of the war he was allowed to return to his country. He was afterwards professor of Hungarian literature, director of the Kisfaludy Soc., editor of a journal, and sec. of the Hungarian Acad. (1865–78). Later works are *Katalin* (1850), the third and second parts of *Toldi* (1854–79), *Buda Halála* (1864), and a humorous poem recounting his early adventures (1874). Part of *Buda* has been translated into English.

ARAPAIMA, *ăr-ă-pī'mă:* genus of fresh-water fishes, the largest known fresh-water fishes in the world. They are found in the rivers of S. Amer., and are sometimes taken in the Rio Negro 15 ft. in length, and of the weight of 4 cwt. They are taken with the harpoon, and are highly esteemed for food, both fresh and salted. In the salted state, they have begun to form an article of commerce, and are conveyed in large quantities to Para. The genus *A.* belongs to the family of *Clupesocidæ*, a family of malacopterous fishes, allied to the *Clupeidæ* or herring family, and is remarkable for the mosaic work of strong, bony, compound scales with which the body is covered. About six species are known.

ARARAT, *ăr'a-răt* [*Airarat*, in the old Armenian dialect; i.e., the plains of the Aryans]: ancient name of the fertile plateau through which flows the river Aras or Araxes. It occupies the centre of the mountainous region of Armenia, belonging partly to Turkey and partly to Russia. Notwithstanding the passage Gen. viii. 4, where it is said that the ark rested 'on the mountains of Ararat,' it has become common to give the name A., not to the entire range, but to the mountain called by the Armenians Massis Leusar—i.e., 'mountain of the ark' (known among the Turks as Aghri-Dagh, 'steep mountain;' and among the Persians as Koh-i-Núh, 'Noah's mountain'). It rises in two volcanic cones, known as the Greater and the Lesser Ararat; the former, 17,212 ft. above the sea, is covered with perpetual snow. It is the highest elevation of Western Asia; and since the war of 1827 it forms the point where the Russian, Turkish, and Persian territories meet. In 1840, the form of the mountain

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was partially changed by a frightful and destructive earthquake. Previous to this period, at the base of the mountain, and at a point where a stream runs from a wild gorge, there stood the village of Arguri or Aguri, surrounded by gardens and orchards, with upwards of 1,000 inhabitants. In the ravine, 2,300 ft. above the village, stood the Armenian convent of St. James; and 1,000 ft. higher still, a chapel dedicated to St. James. The beauty and mild air of the district made Anguri a favorite summer resort of the richer inhabitants of Erwan. It was to undergo a great change, however. On June 20, 1840, dreadful shocks of earthquake were felt. Great masses of the mountain were thrown into the plain, the ravine was closed, the convent and chapel disappeared, and the village, and the gardens which surrounded it, were buried under rocks, earth, and ice, and with the inhabitants utterly destroyed. Tournefort made a partial ascent of the mountain in 1700; since then, ascents have been made in 1829 by Professor Parrot of Dorpat and his companions; in 1850 by Colonel Chodzko, and a large party of Russians engaged in the Transcaucasian triangulation; in 1856 by Major Robert Stuart; and in 1870 by Dr. G. Radde and Dr. G. Sievers. These naturalists, the former of whom is director of the museum at Tiflis, have carefully explored the mountain and district in which it is situated. See their 'Reisen in Armenschen Hochland' (*Petermann's Mittheilungen* for 1871); also the *Transcaucasia and A.* of Mr. Bryce, who made the ascent in 1876.

ARAS, *ăr'as:* the ancient *Araxes*, a river of Armenia, formed by the junction of the Bingol Su and the Kaleh-Su, and uniting its waters with those of the Kur (ancient *Cyrus*) after a course of about 500 miles. The main stream is the Bingol-Su, which rises in the Bingol-Tagh, lat. 41° 30′ n., and long. 41° 10′ e.; and flowing n.n.e., is joined a little below Hasan-kaleh by the Kaleh-Su, after which the combined stream is called the A. It then flows e., forming for some time the s. boundary of the province of Kars, till it is joined by the Arpa, which flows into it from the north. After this, it divides Russian and Turkish Armenia; at some distance to the s. of Erivan it turns to the s.e., along the base of Ararat; soon after which it receives the waters of the Zenghi, a river descending s. past Erivan. Near Djulfa it runs e. for about 60 m.; after which it runs to the n.e. for upwards of 125 m., till it is joined by the large river Kur, descending from the Caucasus through Georgia. Their united waters, after a short e. course, turn suddenly to the s., and fall by three mouths into the Gulf of Kizilgatch, in the Caspian, in lat. 39° 20′ n.

ARATUS, *â-rā'tŭs*, OF SICYON: a distinguished Greek statesman; b. abt. B.C. 271. His youth fell among the party strifes of his native town, in which his father, Clinias, met his death; and he himself was only saved by the efforts of his aunt, who had him secretly conveyed to Argos, whence he returned, in his twentieth year, and liberated Sicyon from its tyrant, Nicocles, B.C 251. Supported by Ptolemæus Philadelphus, A. restored the republican form of govern-

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ment to Sicyon, and united it with the Achaian League, of which he was appointed general, B.C. 245. During his honorable but checkered career, this office was conferred on him seventeen times. His great object was to unite the Greek states, and form out of them an independent nation; but this was thwarted by their mutual jealousies. A. was a brave general, a skilful tactician, and a disinterested patriot. A. died by poison administered to him by command of Philip III. of Macedon.

ARATUS OF SOLI (or Pompeiopolis, in Cilicia): wrote about B.C. 270, a Greek didactic poem, entitled *Phænomena*, founded on the astronomical system of Eudoxos of Cnidos, and appended to it another poem, *Diosemeia*, giving rules for prognostication of the weather. A pure style and correct versification mark both poems, which were translated into Latin by Cicero, Cæsar Germanicus, and Rufus Festus Avienus. A. was a native of the same province as the apostle Paul, who quotes from him in his speech on Mars' Hill: 'For as certain of your own poets have said, We also are his offspring' (Acts xvii. 28). The best editions are by Buttmann (1826), Bekker (1828), and Köchly (1851).

ARAUCANIA, *ă-raw-kâ'ne-â:* country of the Araucos or Araucanian Indians, in the s. of Chili. The Chilian province of Arauco, between the rivers Biobio and Valdivia, was incorporated 1852; but the Indians occupy a large territory in Arauco and the more s. provinces of Valdivia, and still maintain their independence of the Chilian republic. The Araucanians are interesting as furnishing the only example of Indian self-government in the presence of the European races. Their country is divided from n. to s. into four parallel regions, varying from each other, with some regularity, in soil and climate. There are the coast region, the plain region, the region of the Lower Andes, and the region of the Higher Andes. The productions of A. are similar to those of Chili. The pop. cannot be accurately estimated on account of the independence of the nation; but the most recent estimates of the aboriginal population are from 10,000 to 50,000.

A. has the proud distinction of being the only portion of the new world that has never received the European yoke. From the days of Pizarro and Almagro downwards, it has uniformly vindicated its freedom—its wars of independence having lasted, with intervals of precarious truce, from 1537 to 1773. In 1861, a French adventurer, De Tonneins (1820–78), ingratiating himself with the Indians, was elected king of A. See his *L'Araucanie* (Bord. 1878); R. Smith's *Araucanians* (New York, 1855); and Medina's *Aborijenes de Chile* (Santiago, 1882).

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ARAUCARIA, *ăr-aw-kā'rĭ-ă:* genus of plants of the natural order *Coniferæ* (q.v.) or Pines, consisting of lofty trees, natives of the s. hemisphere, and distinguished by having the male and female flowers on separate plants, the pollen of the male flowers contained in 10–20 cases pendent from the apex of each scale, the female flowers two under each scale; each having one ovule. The species are all evergreen, the leaves broader than in pines and firs, which the trees resemble in their general manner of growth. *A. imbricata,* sometimes called the CHILI PINE, a native of the Andes of Chili, forming forests on their w. declivities, attains a height of 150 ft., the trunk quite straight and free from knots.

Araucaria imbricata:
End of a branch, much reduced, showing the mode of ramification, and the manner in which the leaves are imbricated.

The bark of the young trees is studded with leaves from the base upwards, even until 12 or 15 years of age. The branches are in whorls of 6, 7, or 8. Young trees have branches almost from the ground; old trees have tall naked stems, with a crown of branches. The female strobile (cone) is roundish ovate, 8–10 inches in diameter, the scales terminated by a long awl-shaped point, the seeds wedge-shaped, and more than an inch in length. The outer and inner bark of full-grown trees are each 4–6 inches in thickness; the outer bark of a corklike texture; the inner, fungous and porous. From both outer and inner bark, and indeed from all parts of the tree, resin flows readily and in great abundance. The leaves are lanceolate, about 1½ inch in length and ¼ inch in breadth near the base, sharp-pointed. The timber is heavy, solid, hard, fibrous, yellowish white, and beautifully veined. It is very suitable for masts of ships. The resin, which is white, has a smell like frankincense, and a not unpleasant

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taste. It is applied as a plaster to contusions. The seed is pleasant to the taste, not unlike the chestnut, and is a most important article of food to the Indians. It is eaten raw, boiled, or roasted. A spirituous liquor is also distilled from it. A single strobile sometimes contains between 200 and 300 seeds, and one tree may be seen loaded with 20 or 30 of these great strobiles. This Araucaria was introduced into Britain in the end of the last century, and is now frequently planted. It promises to add—like the larch and the spruce—

Araucaria imbricata: Sketched in the Botanic Gardens, Edinburgh.

a new feature to British landscapes, and will probably prove important in an economical point of view. *A. Brasiliana*, the Brazil Pine, has loosely imbricated lanceolate leaves, and a looser and more spreading habit than *A. imbricata*. The seeds or nuts are sold as an article of food in Rio Janeiro. The resin which exudes from the tree is mixed with wax to make candles. *A. excelsia*, now called *Eutassa excelsa* (and by some *Altingia*), the Norfolk Island Pine, a native of Norfolk Island, New Caledonia, etc., attains a height of 160–220 ft., free from branches to 80–100 ft., and with a trunk sometimes 11 ft. in diameter. The wood is white, tough, close-grained, and so heavy as almost to sink in water. The leaves of the young trees are linear and spreading; those of the adult are ovate, and closely imbricated. The strobiles are ovate, 4–5 inches in length. *A. Cunninghamii*, now also ranked in the new genus *Eutassa* or *Altingia*, the Moreton Bay Pine, a native of the shores of Moreton Bay and banks of the Brisbane river in New South Wales, very much resembles the last. It attains a height of 60–130

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ft., and a diameter of 4–8 ft. The leaves of the adult trees are lanceolate and imbricated. The wood is yellowish, and is used for boat-building, house-carpentry, and the common kinds of furniture. The large seeds of *A. Bidwillii* are used for food by the natives at Moreton Bay.

Certain fossil *Coniferæ* found in carboniferous sandstone have received the name *Araucarites*. Livingstone found a forest of large silicified trees near the Zambesi, which Mr. Quekett, on examination of specimens, ascertained to be 'silicified coniferous wood of the Araucarian type.' Fossil trees of the same type occur in the carboniferous strata of Britain. The woody fibre exhibits rows of dots that alternate with dots of other rows, unlike other pines.

ARAUCARITES, n. plu. *ă-raw'kăr-ĭtz* [*Arauca'rĭăn*, an Indian tribe of Chili]: in *geol.*, the fossil wood whose structure is identical with that of the living AR'AUCA'RIÆ, *-kā'rĭ-ē*—trees, natives of the southern hemisphere.

ARAUJO DE AZEVEDO, *â-row'zho dâ-zā-vā'do*, ANTONIO DE, afterwards Count da Barca: 1754, May 14—1817 June 21; b. Sá, near Ponte de Lima, Portugal. At the age of 11, he was sent to Oporto to study under his uncle, who held a high military command. In 1787, he was appointed Portuguese ambassador to the Hague. Before entering on his duties, he visited England, where he omitted no opportunity of obtaining a knowledge of English manufactures, commerce, politics, etc. Then he employed himself similarly in Paris.

At length he resigned his ambassadorship (for the political complications, see under PORTUGAL—*History*) and travelled through Germany, enlarging the sphere of his studies in various departments, scientific and literary. After the Peace of Amiens, A. was sent as ambassador to St. Petersburg; in 1803, he was recalled to Lisbon, to assume the office of sec. of state; and in 1806 he obtained the highest political dignity in the kingdom. His efforts to introduce the various agencies of civilization, while he occupied this situation, were unremitting. But the sudden approach of the French army put an end to all his improvements. The royal family, which Bonaparte had formally dethroned in his victorious proclamation, emigrated to Brazil. A. embarked also, taking a complete printing apparatus, his mineralogical collection, arranged by Werner, and all necessary chemical instruments. During the first years of his residence in Brazil, he devoted himself assiduously to scientific and literary pursuits; founded a school of medicine and chemistry, introduced the cultivation of tea, an improved machine for sawing wood, and a sugar-alembic, and established a porcelain manufactory. He had also a magnificent garden, the plants of which were scientifically arranged.

ARAURE, *â-row'rā:* t. of Venezuela, S. America; lat. 9° 17′ n., long. 69° 28′ w.; 60 m. e.n.e. of Trujillo, in a region noted for its fertility in the production of cotton, coffee, cattle, etc. Pop. 10,000.

ARAVULLI, *ăr'a-vŭl'lē:* range of mountains in w.

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India; from about 22° 40′ n. lat., 74° e. long., to 26° 50′ n. lat., 75° e. long. The highest summit is Abu (q.v.). The n.e. extremity of the range sinks into comparatively low rocky hills. The n.w. side is very bold and precipitous, the s.e. less so. There is no road practicable for wheel-carriages across this range for a distance of 220 m.

ARBACES, *ăr-bā′sēz:* founder of the Median empire, B.C. 876. He was one of the generals of Sardanapalus, king of Assyria, and had command of the contingent from the prov. of Media. He conspired with Belesys, a Chaldæan priest, who commanded the troops from Babylon, and having gained over several other officers of the king, they revolted. After a short contest, Sardanapalus was defeated, and committed suicide. The dynasty founded by A. lasted till its overthrow by Cyrus, B.C. 559. Arbaces, the Mede, is to be distinguished from the satrap of the same name who commanded a division of the army of Artaxerxes in his war with his brother Cyrus.

ARBALEST, *ăr′bă-lĕst*, or ARBALIST, n. *-lĭst*, or ARBLAST, n. *ăr′blăst*, or AR′CUBALIST [L. *arcus*, a bow; *balis′ta*, an engine for throwing stones or darts]: in *OE.*, a crossbow. ARBALISTER, n. *ăr′bă-lĭs′tĕr*, a crossbow-man. The A. or Crossbow was a weapon much in use in feudal times. Its recognized position among military arms dated from about the period of Richard I. The smaller kinds of A. were bent

Arbalest.

by pressing the hand on a small steel lever called the 'goat's foot'; but the larger kinds were bent by placing the foot in a loop or stirrup at the end of the central shaft, and drawing the cord upwards with the hand. At a later period, the bow was made very strong, often of steel; in this form it required a mechanical contrivance, called a 'moulinet,' to bend it. Sometimes ordinary arrows were used with the A., but more usually arrows of a shorter and stouter kind, called 'carrials' or 'quarrels,' were employed; these had a four-sided pyramidal form of head. Occasionally stones and leaden balls were shot from the larger Arbalests. The arbalisters, or crossbow-men, carried a quiver with fifty arrows as an armament in some of the battles of the 13th c. They were an essential component of armies of that period, taking up their position in the van of the battle-array; some were mounted, some on foot, and they occasionally wore armor. The supply of arrows or quarrels was carried after them to the battle-field in carts. The A. continued to be a favorite weapon in England throughout the 13th c.; but in the 14th, it gave way to the long-bow, which was found more convenient in battle. For the long-bow, see

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BOW AND ARROW; for the military system to which it belonged, see ARCHERS AND ARCHERY.

ARBALESTI'NA: in the military system of the middle ages, a small window or wicket through which the crossbowmen shot their quarrels or arrows at an enemy besieging a fortified place.

ARBELA, *ăr-bē'lâ*, now ERBIL or ARBIL: a small t. of Assyria, e. from Mossul, famous as having given name to the battle in which Alexander finally defeated Darius, B.C. 331. The battle was really fought near Guagamela (the 'camel's house'), to the n.w. of A.

ARBITER, n. *âr'bĭ tĕr* [L. *arbĭter*, an umpire or judge Fin. *arpa*, a lot or symbol]: one appointed to settle a matter in dispute between two or more persons; one intrusted with the power of decision or regulation. ARBITRAMENT, n. *âr-bĭt'rā-mĕnt*, decision; determination. ARBITRABLE, a. *âr'-bĭ-trā-bl*, determinable. ARBITRAL, a. *âr'bĭ-trăl*, of arbitration. ARBITRARY, a. *âr'bĭ-trĕr'ĭ*, despotic; tyrannical; guided by will only. AR'BITRAR'ILY, ad. *-ĭ-lĭ*, with no other rule or guide than the will. AR'BITRAR'INESS, n. the quality of being tyrannical or despotic. ARBITRATE, v. *âr'bĭ-trāt* [L. *arbitrātus*, pronounced upon, as a dispute]: to hear and decide in a disputed matter; to determine. AR'-BITRA'TING, imp. AR'BITRA'TED, pp. ARBITRATION, n. *âr'bĭ-trā'shŭn*, the hearing and deciding of a disputed matter by one or more persons. ARBITRATOR, n. *âr'bĭ-trā'tĕr*, a person chosen to decide a dispute; he who, or that which, puts an end to a thing; an arbiter. ARBITRESS, n. *âr'-bĭ-trĕs*, or ARBITRATRIX, n. *âr'bĭ-trā'trĭks*, a woman who decides.—SYN. of 'arbiter': arbitrator; umpire; controller; governor; ruler; judge; referee;—of 'arbitrary': absolute; despotic; tyrannical.

AR'BITRAGE: term used for the comparison and settlement of disputed accounts, and the composition of business, or trade disputes. The expression is applied, e.g., to the adjustment of prices of any commodity simultaneously in two or more markets, in terms of the quotations employed in a given locality, the difference of exchange being calculated. It is also applied to business done on the basis of such calculations, as by making purchases in whatever is for the moment the cheapest market, and selling in the dearest; in this sense it is used in traffic in bills and exchange, in coin and bullion, and in stocks, as well as in commodities.

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ARBITRATION: adjudication by private persons appointed to decide a matter, or matters in controversy, or a reference made to them for that purpose, either by agreement of the disputants or by the order, or on the suggestion, of a court of law. The proceeding generally is called a *submission to arbitration*, or *reference;* the parties appointed to decide are termed *arbitrators* or *referees;* and their adjudication is called an *award*. This mode of settling disputes is not only frequently resorted to by litigants themselves, who are anxious to avoid the delay and expense of proceedings in the public tribunals, but the statute-books bear witness to the approval of it by the legislature at various times, and there are recent statutes rendering A., or private reference, in certain cases compulsory. International arbitration has been of late repeatedly resorted to in matters of debate between nations. Thus as between the United States and Britain, the San Juan boundary question and the Alabama (q.v.) dispute were so arranged. Diplomatic conferences, which often obviate war, belong to a different category. See LONDON CONFERENCES.

The matters that may be determined by an arbitrator are all personal disputes and differences which might otherwise be made the subject of controversy in the courts of civil jurisdiction. Thus breaches of contracts generally, breaches of promises of marriage, trespass, assaults, charges of slander, differences respecting partnership transactions or the purchase price of a piece of property, all may be referred to A. Questions relating to real property may also be referred, such as those relating to the partition of lands of joint tenants or tenants in common, to settlements of disputed boundaries—to differences between landlord and tenant respecting waste—and to the title to land. Pure questions of law may also be referred to the decision of an arbitrator. An arbitrator may have, therefore, to determine the liability of a party on a promissory-note or bill of exchange, or to construe an act of the legislature, or to give a judicial opinion on the effect of a will or deed. Actions at law, and suits in equity, may also be settled by A.; and this kind of reference may be made at any stage of the proceedings, sometimes even after the verdict, and probably by analogy, after decree in equity. Questions relating to the future use and enjoyment of property, and future or anticipated differences between parties, may likewise be referred. In some of the states, however, some matters depending on points strictly technical are excluded from A., in view of the fact that arbitrators often are not learned in the law.

A matter, however, clearly illegal, cannot be made the subject of a valid reference. But where transactions between parties have been brought to a close by a general award, apparently good, the courts have refused to reopen them on a suggestion that some legal item had been admitted in account.

It is not the policy of the law to refer to A. felonies and offenses of a public nature; because the public safety requires them to be punished, and for this purpose they can

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be properly tried only in one of the ordinary courts of the country.

Yet there are certain misdemeanors which may be settled either by agreement or by means of an A., on a principle of very general application which has been well stated—that where there is a remedy, by action as well as by indictment, a reference of the matter in controversy is good. And in these cases of misdemeanor, a compromise or settlement under a reference may be made, even after conviction, but with the sanction of the court.

As to the parties who may make a reference to A., it may be stated generally, that every person capable of making a disposition of his or her property or release of rights, may make a submission to an award.

Partners and corporations may make references to A. on the principles above noted, and according to the relation in which they stand to the matter in dispute.

As to a reference to A. by act of counsel, aside from client, formerly advocated by high English authority, the feeling of the bar in England now is that it is unwise to refer or compromise a litigation on the independent authority of counsel.

Disputes may be referred to A. in any manner that expresses the agreement or understanding of the parties to be bound by the decision of the arbitrator; and for this purpose no formal submission, either verbal or written, is necessary; but the arrangement must be such as manifestly to show an intention to have the difference concluded by a private adjudication in the nature of an award. But where the submission is in writing, it must be executed in due form. A testator, however, cannot exclude his will from litigation by a proviso, that all differences respecting it shall be referred to A., although it is thought that the parties benefited by the will might themselves so refer. Generally speaking, it is advantageous to make the A. in such a form as that the award may be made a rule of court—that is, may be adopted by a court of law as its judgment on the matter submitted, a proceeding that affords an obvious facility in enforcing the award.

The arbitrator ought to be a person who stands perfectly indifferent between the disputants; but there are no other particular qualifications for the office. And the choice by parties of the person who they agree shall decide between them is perfectly free. Some legal writers have even gone so far as to maintain, that not only infants and married women, but even idiots and lunatics, can be arbitrators, on the argument that every person is at liberty to choose whom he likes best for his private judge, and he cannot afterwards object to the deficiencies of those whom he has himself selected. But this, it is clear, is going too far, and the policy of the law would certainly be interposed against such extreme cases. It is better to state the rule to be that on the condition that the party selected is of ordinary intelligence, the choice of an arbitrator is absolutely unfettered. The only exception to this rule is the case of a party who, by office or position, is the person pointed out for the duty under a reference made by statute. In matters of compli-

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cated accounts, mercantile men are generally preferred. In other cases, it is usual to appoint lawyers, who, being accustomed to judicial investigations, are able to estimate the evidence properly, to confine the examination strictly to the points in question, and, in making the award, to avoid those informalities in respect of which it might afterwards be set aside. Both time and expense are thus saved by fixing on a professional arbitrator. It has, indeed, been wisely remarked, that an arbitrator should endeavor to arrive at his conclusions upon the same rules and principles which would have actuated the court for which he is substituted—a rule of conduct that obviously points to the expediency of a lawyer being the referee. But an arbitrator is not bound by the mere rules of practice which prevail in the ordinary courts of justice, and he has been held justified in allowing interest on both sides of an unliquidated account, although such a determination was against the practice of the Court of Chancery, where the suit which had been referred had been commenced.

The proceedings before an arbitrator are regulated according to the peculiar circumstances of the case submitted, but generally it is advisable to conduct them according to the forms observed in courts of law, and they usually are so conducted. Each of the parties furnishes the arbitrator with the statement of his case, which is done by giving him a copy of the briefs on each side; and on the day appointed he proceeds to hear them (either in person or by their counsel or attorneys), and to receive the evidence on each side, nearly in the same manner as a judge at an ordinary trial. Having so heard the case, the arbitrator proceeds to make his award, which need not necessarily be in writing, for a verbal award is perfectly valid; but in practice it is usual for the arbitrator to make written award which he delivers to the successful party. The unsuccessful party also gets a copy of the award. This award in its effect operates as a final and conclusive judgment respecting all the matter submitted, and it binds the rights of the parties for all time.

An award may be set aside on the ground of corruption and fraud in the arbitrator, and for any material irregularity or illegality appearing on the face of the proceedings. But the tendency of the courts is to favor arbitrations and maintain awards, unless such serious grounds as are above referred to can be substantiated.

Where there are two arbitrators, the submission often provides that in the case of their differing in opinion the matter referred shall be decided by a third person, called an umpire, who is generally appointed under a power to that effect, by the arbitrators themselves. But they cannot make such an appointment unless specially authorized so to do by the terms of the submission. This umpire rehears the case, and for this purpose is invested with the same powers and bound by the same rules as the arbitrators.

In A., from the nature of the case, there can be no appeal on the merits of the dispute to any public tribunal.

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ARBITRATION, INTERNATIONAL: a substitute for war which in our times is receiving strong support from leading minds in Great Britain and the United States. Since 1816, there have been 112 arbitrations between different European nations, the United States, and the states of Central and South America, in all cases with practically satisfactory result.

Much has been done for the principle of A. by the Assoc. for Reform and Codification of the Laws of Nations (now known as 'The International Law assoc.'), organized at Brussels 1873, whose membership is drawn from all the chief nations and represents the highest standard of ability, learning, and public spirit, and which 'aims to promote international arbitration, to conserve the peace of the world,' etc. The International Peace soc. also has labored effectively for the same object. For notable instances of A. in controversies between the United States and Great Britain, see GENEVA ARBITRATION: VENEZUELAN QUESTION. After long correspondence between the Marquis of Salisbury and Secretary of State Olney, a General Arbitration Treaty between Great Britain and the United States was agreed on, and, 1897, Jan. 11, submitted to the U. S. senate. The essential features of the treaty were:

Agreement to arbitrate all questions in difference which the two nations may fail to adjust by diplomatic negotiations.

Pecuniary claims of less than £100,000 to be settled by majority vote of an arbitral tribunal of three persons; claims in excess of that amount to require a unanimous vote, or, failing of that, to be submitted to a new arbitral tribunal of five, of whom a majority shall decide.

Territorial claims to be submitted to a tribunal of six persons, of whom three shall be members of the supreme court or of the circuit courts of the United States, and shall be selected by the pres., and three shall be members of the supreme court of justice or of the judicial committee of the privy council of Great Britain, and shall be selected by the sovereign: their award by a majority of not less than five to one to be final: an award by less than the prescribed majority to be final unless protested within three months. In such case, or when the vote is evenly divided, no recourse shall be had to hostile measures till the mediation of one or more friendly powers shall have been invited by one or the other party.

The treaty was received with almost universal popular favor in both countries, all the principal papers speaking in the highest terms of the patience, the zeal, and the ability of the statesmanship by which it was concluded. But in the U. S. senate vigorous opposition to its ratification was developed, partly, it was charged, on partisan grounds, but not without some show of reason; and after long debate and many enfeebling amendments, the treaty was finally rejected, 1897, May 5, by a vote of 43 in the affirmative against 26 in the negative, 19 of the 88 senators not voting.

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ARBOGA, *ar-bo'gâ:* ancient city in Sweden, prov. of Westmannland, on a small river of the same name, by which, with the aid of a canal, the lakes Hialmar and Mälar are united. A. was an important commercial town, but has now sunk into insignificance, having only an historical interest from the antiquities in its neighborhood. Of all its churches, cloisters, and chapels there remain only the town and parish churches, the former with an altar-piece of Rembrandt's. Several kings of the family of Vasa have resided here. Church assemblies were held here in 1396, 1412, 1417, 1423, 1474; diets in 1435, 1440, 1471, 1529, and 1561, in which last year also certain articles, known as the A. Articles, were passed, by which Eric XIV. was enabled to limit the power of the nobles; and in 1625, Gustavus Adolphus issued an edict here, commanding that the copper coin of the realm should contain its full worth of copper. Pop. (1890) 4,576.

ARBOR, n. *ăr'bĕr* [L. *arbor*, a tree: OE. *herbere* (*hĕr'bĕr*), a garden]: a seat shaded with trees; a bower; an axis or spindle. **ARBORATOR**, a. *ăr'bŏ-rā'tĕr*, one who grows trees. **ARBORED**, a. *ăr'bĕrd*, furnished with an arbor. **ARBOROUS**, a. *ăr'bŏ-rŭs*, or **ARBOREOUS**, a. *ăr-bō'rē-ŭs*, resembling or belonging to a tree. **ARBORESCENT**, a. *ăr'bŏ-rĕs'ĕnt* [L. *arbores'cens* or *ar'borescen'tem*, growing to a tree]: branched like a tree; having crystallizations disposed like the branches of a tree; in moss-like aggregates like the frost-flowers on a window-pane; becoming woody. **AR'BORES'CENCE**, n. *-sĕns*, or **AR'BORIZA'TION**, n. *-ĭ-zā'shŭn*, the resemblance of a tree in minerals; groups of crystals in the form of a tree. **AR'BORET**, n. a small tree; a shrubbery. **ARBORETUM**, n. *ăr'bŏ-rē'tŭm* [L.]: a place for cultivating rare trees and shrubs. **ARBORICULTURE**, n. *ăr'bŏr-ĭ-kŭlt'ŭr* [L. *cultu'ra*, tillage]: the art of planting and managing trees and shrubs. **AR'BORICULT'URAL**, a. *-ŭr-ăl*, pertaining to. **AR'BORICULT'URIST**, n. *-kŭlt'ŭr-ĭst*, one who. **AR'BORIST**, n. one who studies trees.

AR'BOR DAY: in the United States, a day in each year, set apart by legislative enactment or otherwise, for voluntary planting of trees by the people. The custom was started in Neb. 1874, and was observed (1890) in 35 states, in nearly all of which the planting was done by public-school children with appropriate exercises.

ARBORES'CENT: term applied to plants to signify that they possess either altogether, or in some measure, the character of trees. Even the dwarf willows and birches, on the confines of polar or alpine perpetual snow, are described as the A. vegetation of these regions.

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ARBORICULTURE, *ăr'bĕr-ĭ-kŭl'tūr:* art of planting and raising trees and shrubs for useful or ornamental purposes, but not including the cultivation of fruit-trees, which comes under the head of Horticulture (q.v.).

The ancient Egyptians, Greeks, and Romans practiced A. to a very limited extent. Germany seems to have been the first country to plant timber-trees in a systematic manner, beginning in the 15th c. Great Britain followed in the next c., but on only a small scale. The early English laws (see FOREST LAWS) were framed for preserving game, and not specially for maintenance of timbered lands, whose area diminished as population increased. As larger quantities of timber were required for building purposes, importations soon became necessary. Evelyn's great work *Sylva* (1664) stimulated tree-planting, particularly in the ornamental line, and in the 17th c. nurseries for propagation of such trees were established. In the next c. considerable attention was given to A. in Scotland and Ireland, and early in the 19th c. the demand for ship-timber led to extensive planting of trees for that purpose. After the overthrow of Napoleon, this demand was lessened and the culture of forest-trees was neglected, though that of ornamental trees and shrubs, particularly of varieties from abroad, was increased. Societies have been formed in Great Britain for encouragement of A., and in India tree-growing is largely under govt. supervision; but Germany gives it greater attention than any other nation.

Until recently, little was done in the United States in planting timber-trees. The need of protection of crops and live-stock led many farmers, particularly at the west, to plant lines or belts of trees for wind-breaks; and the establishment of arbor day (see ARBOR DAY), and the work of the newspaper press in calling attention to the dangers threatened by the destruction of our forests, have given a great impetus to A. in a large portion of the country. Trees for planting are obtained often from swamps or upland woods; but much finer and in the end more profitable specimens can be obtained from seed. The leading nurseries supply some of the best varieties of timber-trees, but some planters prefer to grow what they require. The seed must be planted in good and carefully prepared soil, and for a few years the trees need careful culture and protection from the various enemies to which they are exposed. They should be transplanted once or twice before being placed where they are finally to stand, but they should be put in their permanent positions when not more than three or four feet in height. The transplanting of large trees is difficult, and seldom gives satisfactory results. Small trees suffer much less than large ones when removed, and, if placed in good soil and carefully cultivated for a few years, will make a far more rapid and healthful growth than large specimens. The varieties of trees for planting should be selected with reference to their adaptation to the climate and soil. Some kinds which thrive in cold regions do not thrive where the summers are long and hot; some will safely endure ex-

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posure to winds and sea-air, which would be ruinous to others; and the success or failure of a variety is determined often by the degree of moisture in the soil. To a certain extent, however, the soil can be fitted, by draining and manuring, for the production of trees to which it is well adapted; and by planting in sheltered places it is often possible to grow fine specimens of half-hardy trees far beyond their natural limits. The cultivation of trees for strictly ornamental purposes properly comes under the head of Landscape-gardening (q.v.) Copse or coppice wood, largely grown in England, is subject to different treatment from that given to timber or ornamental plantations: see COPPICE: TREE.

ARBORVINE, *ăr'bĕr-vīn* [L. *arbor*, a tree; *vinĕa*, a vine]: a sort of bind-weed.

ARBOR VITÆ, *ăr'bŏr vī'tē* (*Thuja*): a genus of plants of the natural order *Coniferæ*, allied to the cypress; consisting of evergreen trees and shrubs with compressed or flattened branchlets—small, scale-like, imbricated leaves—and monœcious flowers, which have 4-celled anthers, and the scales of the strobiles (or cones) with two upright ovules.—The common A. V. (*T. occidentalis*) is a native of N. Amer., especially between lat. 45° and lat. 49°, but has long been well known in Europe. In some localities it forms a tree of 40–50 ft. high; its branches are horizontally expanded, and the strobiles (cones) small and obovate. It is the parent of many varieties, some of which are extensively propagated in nurseries in the n. U. S. to be planted for ornamental purposes either singly in lawns or in the form of a hedge. (See HEDGE.) The wood of the stem is reddish, soft, and very light, but compact, tough, and durable, bear exposure to the weather remarkably well and is useful for fence posts. It is very common in Britain, but planted chiefly as an ornamental tree, and seldom attaining so great a size as in its native country. It thrives in cool, moist situations. The CHINESE A. V. (*T. orientalis*), native of China and Japan, immediately distinguishable from the former species by its upright branches and larger, almost globose and rough strobiles, is also in Britain, and upon the continent of Europe, a common ornament of pleasure-grounds; but it

Arbor Vitæ (*Thuja occidentalis*): End of branch, showing mode of ramification and fruit.

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does not attain so great a size as the preceding, and is more sensitive to the cold of severe winters. The balsamic smell is very agreeable. The tree yields a resin, having a pleasant odor, to which high medicinal virtues were formerly ascribed; hence the remarkable name, *Arbor Vitæ* (Latin, signifying Tree of Life), given to this species, and extended to the genus. Other species are known, but they are less important than these. In its native country, this species also attains the size of a considerable tree.—There are several other species of *Thuja*, some of which seem well suited to the open air in the climate of Britain and the n. United States, and others require the protection of greenhouses. Among the former are *T. plicata*, from Nootka Sound; and *T. dolabrata*, native of Japan, a tree of great height and thickness, and which will probably prove the most important of the whole genus.—A tree, common in N. Amer., and there known by the name of WHITE CEDAR, is sometimes included in the genus *Thuja*, under the name of *T. sphæroidea*, but is more generally ranked in the genus *Cupressus* as *C. thyoides*. See CYPRESS. The timber is highly esteemed, and an infusion of the scrapings is sometimes used as a stomachic. Closely allied to the genus *Thuja* is *Callitris*. See SANDARACH.

ARBROATH, *ár'bröth*, ABERBROTH'WICK, or ABERBRO'THOCK: seaport town in the e. of Forfarshire, at the mouth of a stream called the Brothock. Pop. (1894), parliamentary burgh, 22,960. Here King William the Lion founded a Tyronensian abbey in honor of Thomas à Becket, 1178. The king was interred in it, 1214. In the abbey, Bruce and the Scottish nobles met in 1320, to resist the claims of Edward II. to Scotland. Cardinal Beaton was the last of its abbots. Next to Holyrood, the abbey was the most richly endowed monastery in Scotland. It was destroyed by the Reformers in 1560. Its ruins—which are cruciform, 270 by 160 ft.—are very picturesque, presenting lofty towers, columns, Gothic windows, and a fine circular e. window, 'the Round O of A.' The chief industries of A. are flax-spinning, jute-spinning, and the manufacture of sail-cloth. The new harbor, begun 1841, admits vessels of 400 tons; it is protected by a breakwater. Serious damage was done to the wet-dock entrance in 1882 by a gale and high tide. In 1880, above 40 vessels belonged to the port. The chief exports are grain, potatoes, fish, pork, and pavement, chiefly from quarries 8 or 10 m. inland. A. is a royal burgh, and in conjunction with Montrose, Brechin, Forfar, and Bervie burghs, returns one member to parliament. A. is supposed to be the Fairport of *The Antiquary*, and the Redhead Crags and Coves form some of the scenes in that novel. The famous Bell-rock Light-house is 12 m. s.e. of A.

ARBUSCLE, n. *ár'bŭs-sl* [L. *arbus'cula*, a small tree]: a dwarf tree; a small shrub with the appearance of a tree, as many heaths. ARBUSCULAR, a. *ár-bŭs'kū-lér*, shrub-like. ARBUSTIVE, a. planted with shrubs or trees; containing copses of shrubs or trees.

ARBUTE, n. *ár'būt* [L. *ar'bŭtus*]: the strawberry tree. ARBUTEAN, a. *ár-bū'tē-ăn*, pertaining to.

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ARBUTHNOT, *ăr'bŭth-not*, JOHN: d. Hampstead, 1735, a distinguished writer and physician, contemporary and friend of Pope and Swift: son of a Scottish Episcopal clergyman; born at Arbuthnot, Kincardineshire, shortly after the Restoration. He studied medicine at Aberdeen; and, removing to London, supported himself by teaching mathematics. In 1697, he published an examination of Dr. Woodward's account of the Deluge, which brought him into notice. Accident called him into attendance on Prince George of Denmark, who thenceforth patronized him. In 1709, he was appointed physician to the queen, and in 1710 was elected a member of the Royal College of Physicians. On the death of Queen Anne, 1714, he lost his situation. In 1717, A., with Pope, gave assistance to Gay in a farce entitled *Three Hours after Marriage*, which, though having the aid of a trio of wits, was a failure. In 1723, he was chosen second censor of the Royal College of Physicians; in 1727, he was made an Elect, and had the honor to pronounce the Harveian oration for the year. A. was one of the leaders in that circle of wits which adorned the reign of Queen Anne, and was still more nobly distinguished by the rectitude of his morals and the goodness of his heart. He assisted Swift and Pope in the composition of that brilliant satire, the *Memoirs of Martinus Scriblerus*, contributing those portions of it which refer to science and philosophy; and he was undoubtedly the author of the celebrated political *jeu d'esprit*, the *History of John Bull*, which has so often been imitated. Besides several medical essays, he published *Tables of Greek, Roman, and Jewish Measures, Weights, and Coins* (Lond. 1705–08), a work which was long the best authority on the subject. There is also a philosophical poem of his composition in Dodsley's Miscellanies, entitled *Know Thyself*.

ARBUTUS, *ăr'bū-tŭs:* genus of plants of the natural order *Ericeæ*, containing a number of species, small trees and shrubs, the greater part of which are American. The fruit is fleshy, 5-celled, many-seeded, usually dotted with little projections, whence that of some species has a sort of resemblance to strawberries; the corolla is urn-shaped.—*A. U'nedo*, the STRAWBERRY TREE, is a native of the s. of Europe, found also in Asia and America, and in one locality in the British Isles, the Lakes of Killarney, where its fine foliage adds much to the charm of the scenery. It requires protection in winter in the climate of Paris. In Britain, it is often planted as an ornamental evergreen. It grows to a height of 20–30 ft., but is rather a great bush than a tree. The bark is rugged; the leaves oblongo-lanceolate, smooth and shining, bluntly serrated; the flowers nodding, large, greenish white; the fruit globose, of a scarlet color, with a vapid sweetish taste. It is, however, sometimes eaten. Of late, excellent alcohol has been made from it in Italy. A wine is made from it in Corsica, which, however, is narcotic, if taken in considerable quantity, as the fruit itself is, if eaten too freely. The bark and leaves are astringent.—*A. Andrachne* is also sometimes cultivated as an ornamental plant in Britain, but is im-

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patient of severe frosts. Its fruit, and that of *A. integrifolia*, are eaten in Greece and the East. But all the species seem to possess narcotic qualities in greater or less degree; the fruit of *A. furens*, a small shrub, a native of Chili, so much as to cause delirium.—*A. aculeata*, which abounds at Cape

Arbutus Unedo, showing branch, flowers, and fruit.

Horn and on Staten Island (lying s.e. of Terra del Fuego), is an elegant and most pleasing evergreen, much resembling the myrtle. It grows to the height of 3 or 4 ft., and produces small white flowers, followed by a profusion of red shining berries, which ornament the bush during winter. Their flavor is insipid, but somewhat astringent. Mixed with a few raisins, they have been made by voyagers into tolerable tarts.—*A. Uva ursi*, now generally called *Arctostaphylos Uva ursi*, the RED BEARBERRY, is a small trailing evergreen shrub, common in the Highlands of Scotland and in the Hebrides, and indeed in the northern parts of Europe, Siberia, and North America. It grows in dry, heathy, and rocky places. The flowers are in small crowded terminal racemes, of a beautiful rose color. The berries are austere and mealy; they are said to form a principal part of the food of bears in northern regions. Grouse also feed on them. The dried leaves are used as an astringent and tonic medicine, and as such have a place in the pharmacopœias, being employed principally in chronic affections of the bladder; but those of *Vaccinium vitis Idæa* are often fraudulently substituted for them.—The BLACK BEARBERRY (*A.* or *Arctostaphylos alpina*) is also a native of the northern parts of the globe, a small trailing shrub, with black berries about the size of a sloe, relished by some, but having a pecular taste disagreeable to others. The plant is found in the Alpine localities of N. Hampshire and Maine.

ARBUTUS, TRAILING or MAYFLOWER: see EPIGÆA REPENS.

ARC, n. *árk* [L. *arcus*, a bow]: a part of a circle or

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curved line. ARCADE, n. *âr-kād'* [F.—from L. *arcus*]: a series of arches; a roadway under a continued series of arches; a covered street. ARCADED, a. furnished with an arcade. ARC OF A CIRCLE, a part of the circumference of a circle cut off by two lines radiating from its centre: see ARCH 1.

ARC: any part of a curved line. A straight line joining the ends of an A. is its *chord*, which is always less than the A. itself. Arcs of circles are *similar* when they subtend equal angles at the centres of their respective circles; and if similar arcs belong to equal circles, the arcs themselves are *equal*. The length of an A. is readily found if the angle which it subtends at the centre of the circle is known, and also the length of the whole circumference. Let the whole circumference be 100, and the angle of an A. 50°, the length of the A. is $360° : 50° :: 100 : \frac{100 \times 50}{360} = 14$ nearly.

ARC: see JOAN OF ARC.

ARCA, *âr'kā*, or ARK-SHELL [L. *arca*, a chest or box]: a genus of equivalve shells, and lamello-branchiate Mollusca, the type of a family called *Arcadæ*, or *Arcaceæ;* found in almost every part of the world. In the true ark-shells, the hinge is straight.

ARCACHON, *ar-kâ-shōng':* a bathing-place which has sprung up recently on the s. side of the Bassin d'Arcachon, 35 m. s.w. of Bordeaux, France. Pop. (1881) 7,087. The fine broad sands are admirably adapted for bathing; and the place is sheltered by sand-hills, covered with extensive fir woods. Its numerous villas among the firs are much frequented in winter by invalids afflicted with lung disease. Scientific oyster culture is practiced here on a large scale. There are 3,300 oyster 'parks' in the lagoon of A., lined with 6,000 ova tiles for the collection of oyster spat, and calculated to yield two hundred millions of infant oysters in a single season. See OYSTER.

ARCADE: a row of arches, supported by columns, either having an open space of greater or less width behind them, or in contact with masonry. The A. in Gothic corresponds to the colonnade in classical architecture. The term A. is sometimes applied to the row of piers, or columns and arches, by which the aisles are divided from the nave of a church, or by which cloisters, sometimes erroneously called piazzas, are enclosed; but it is generally confined to those series of smaller arches which are employed for purposes of ornamentation. Arcades of the latter kind are often found surrounding the square towers of English churches. The term is also applied, improperly, to a glass-covered street or lane, with a row of shops or stalls on each side.

ARCADIA, *âr-kā'dĭ-a:* the middle and highest part of the Peloponnesus: was bounded on the n. by Achaia, on the e. by Argolis, on the s. by Messenia and Laconia, and on the w. by Elis. According to Pausanias, it derived its name from Arcas, the son of Callisto. Next to Laconia, A.

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was the largest country in the Peloponnesus. It had an area of 1,700 sq. m., and was girt round by a circle of mountains, which cut off to a large extent its communication with the rest of the peninsula. Mountains also intersected it in different directions. The western part of what was anciently A. is wild, bleak, and rugged, and was at one time covered with huge forests; the eastern is more fertile, the mountains not so high, and the vales more luxuriant. In these eastern valleys lay all the principal cities of A. The loftiest peak in A.—the loftiest also in the Peloponnesus—is Mount Cyllene, in the n.e. (7,787 ft.). The chief river was anciently the Alpheius (q.v.). Originally A. was named Pelasgia, after its first inhabitants, the Pelasgi. Subsequently, it was divided into several small states which formed a confederation. Of these states, the chief were Mantinea, Tegea, Orchomenos, Pheneus, Psophis, and Megalopolis. The inhabitants, engaged chiefly in tending cattle and in hunting among the wild highlands, remained long in a state of barbarism. After civilization had advanced, and the Arcadians had become known by their love of music and dancing, they still retained some military spirit, and were sometimes engaged as mercenary soldiers. But generally their character accorded with their simple, rural mode of life; though it seems certain that human sacrifices were offered as late as the period of the Macedonian sway. The Arcadians were not remarkable for their intelligence. In fact, an 'Arcadian youth' was a synonym for a blockhead. Pan and Diana were their favorite deities. Ancient and modern poets (the latter especially in the time when 'pastorals' were popular) have described A. as the land of peace, innocence, and patriarchal simplicity of manners.

ARCADIAN, a. *ár·kā′dĭ·án*, pertaining to Arcadia, in the Peloponnesus; much used in poetry in the sense 'rural' or 'pastoral.'

ARCADIUS, *ár·kā′dĭ·ŭs:* first Emperor of the East; 383–408 (reigned 395–408); b. Spain; son of the emperor Theodosius, after whose death the Roman empire was divided into East and West. A. lived in oriental state and splendor, and his dominion extended from the Adriatic Sea to the river Tigris, and from Scythia to Ethiopia; but the real rulers over this vast empire were, first, the Gaul Rufinus, and afterwards the eunuch Eutropius, who openly assumed the reins of government and the command of the army, while A. reposed in luxurious indifference. In 399, the eunuch Eutropius was deposed by another usurper, Gainas, who, in his turn, soon fell a victim to his own ambition. Afterwards, Eudoxia, the wife of the emperor, assumed the supremacy. One really great man adorned this period, the virtuous and eloquent Chrysostom, who was persecuted by Eudoxia, and through her influence exiled in 404, on account of his firm opposition to Arianism, which the empress herself favored. During the reign of A., his territories suffered by barbarian incursions, earthquakes, and famine, but nothing could disturb the indifference of the monarch. He died unlamented.

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ARCANI DISCIPLINA (instruction in secret things): see MYSTAGOGUE, SECRET, DISCIPLINE OF THE.

ARCANUM, n. *ăr-kā'nŭm*, plu. ARCA'NA [L. *arcānus*, secret, concealed]: thing secret, as if locked up. ARCANITE, n. *ăr'kā-nīt*, a mineral, a colorless or white sulphate of potash, occurring mostly in crusts in lavas.

ARCE, *ar'chā* (anc. *Arx*): t. of s. Italy, province of Caserta; 60 m. e.s.e. from Rome. It is situated on a hill near the Liris; and the summit, lofty and precipitous, is crowned by an interesting mediæval fortress called *Rocca d'Arce*. This fortress was considered impregnable till it was scaled and taken by the invading army of Charles of Anjou in 1266. Numerous inscriptions in which the name of Cicero occurs have been discovered near A.; and some ruins near the town are known as *L'aja di Cicerone*, or Cicero's Barn. Pop. (1881) 1,551.

ARCESILAUS, *ăr-sēs'ĭ-lā'ŭs:* B.C. 316—abt. 241; b. Pitane, in Æolia, Asia Minor: a Greek philosopher, founder of the New Academy. He studied philosophy, first under Theophrastus the Peripatetic, afterwards under Crantor. After the death of Crantor, A. became the chief master of the Academic party, or those who held to the doctrines of Plato; but he introduced so many modifications that its philosophic character was completely changed. His great rivals were the Stoics, whose opinions he attacked, but he does not appear to have attained any certainty in his own convictions. He had studied under too many masters, and discussed too many different systems, to be sure of the truth of any. He denied the Stoical doctrine of a 'convincing conception,' which he affirmed to be, from its very nature, unintelligible and contradictory. He also denied the existence of any sufficient criterion of truth, and recommended abstinence from all dogmatic judgments. In practice he maintained that we must act on grounds of probability. It is not easy to determine satisfactorily what his moral character was. A wit, a poet, and a man of frank and generous disposition, which seems to have captivated his disciples even more than his philosophy, he has yet been accused by his enemies of the grossest profligacy; and whatever extravagance there may be in such an extreme charge, it is nearly certain that he died of a debauch in his 76th year. Nevertheless, his adversary Cleanthes, the Stoic, passed this high eulogium on him: 'The morality which A. abolishes in his words, he re-establishes in his actions.'

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ARCH, n. *ärch* [F. *arche*, an arch—from mid. L. *archĭă*, the arch of a bridge: L. *arcus*, a bow, a curved line—lit., the circular part of any building]: the hollow or concave part of a bridge or gateway: V. to cover with an arch; to form an arch. ARCH'ING, imp. ARCHED, pp. *ärcht*. COURT OF ARCHES, n. *ärch'ēz*, a very anc. court belonging to the Archbishop of Canterbury for deciding ecclesiastical matters, so called from the Church of St. Mary *le Bow*, or '*de ar'cubus*.' ARCH'WAY, a way or passage under an arch. TRIUMPHAL ARCH, a magnificent arched structure to commemorate the triumphant return of a conqueror, or to perpetuate some remarkable event.

ARCH, a. *ärch* [Ger. *arg*, morally bad: Dut. *erg*, wicked: Dan. *arrig*, ill-natured: Icel. *argr*, lazy, cowardly: AS. *earg*, bad]: bad and worthless; waggish; mirthful. ARCH'LY, ad. *-lĭ*, shrewdly; roguishly. ARCH'NESS, n. humor with a touch of wicked pleasure; sly humor; waggishness.

ARCH, a. *ärch* or *ärk* [Gr. *archos*, chief; *archein*, to be first: It. *arci*: Ger. *erz*, eminence, good or bad]: chief or principal; chief, or of the first class. ARCHANGEL, see below. ARCHBISHOP, n. *ärch-bĭsh'ŏp*, a chief bishop; a metropolitan having jurisdiction over the bishops of his province. ARCHBISH'OPRIC, n. *-rĭk*, the office, dignity, or see of an archbishop. ARCHI-EPISCOPAL, a. *är'kĭ-ē-pĭs'kō-păl*, pertaining to. ARCHDEACON, n. *ärch-dē'kŏn*, one who assists the bishop in the government of his diocese. ARCHDEA'CONSHIP, n. the office of an archdeacon. ARCHDEACONRY, n. *ärch-dē'kŏn-rĭ*, the living. ARCHIDIACONAL, a. *är'kĭ-dī-ăk'ō-năl*, pertaining to an archdeacon. ARCH-EN'EMY, n. a chief enemy; the evil one; the devil. ARCHDUKE, n. *ärch-dūk'*, a title of some foreign princes. ARCHDUCHESS, n. *-dūch-ĕs*, his wife, sister, or daughter. ARCHDUCAL, a. *-dū'kăl*, of or belonging to an archduke. ARCH'MOCK, n. *-mŏk* [see ARCH 3, and Eng. *mock*]: in *OE.*, pre-eminent mockery. *Note.*—ARCH, followed by a consonant, is pronounced *ärch*, and by a vowel, *ärk*.

ARCH: an arrangement of bricks, stones, or other materials over an open space, by which they are made not only to support each other by mutual pressure, but to sustain a superincumbent weight. We have the excellent authority of Sir G. Wilkinson for stating that the A. was known to, and used by, the ancient Egyptians; and that the Assyrians were acquainted with its principles is placed beyond doubt by the arched gateways so frequently represented in their bass-reliefs. The A. is generally supposed to have been unknown to the Greeks—a supposition which becomes very improbable, if we hold it to be proved that it was used by nations with whose works they must have been familiar. But that the Greeks did not employ it generally in their architectural structures, is certain; and as it is not less certain that the Romans did, it is to the latter people that the nations of modern Europe are indebted for their acquaintance with its great utility. The introduction of the A. by the Romans gradually effected a complete revolution in the architectural forms which they borrowed from the Greeks.

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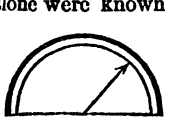
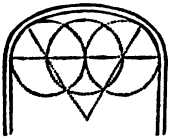
The predominance of horizontal lines gave way by degrees, till, as the Romanesque passed into the Gothic style, it was superseded by the segments of a circle, placed generally more or less in a perpendicular direction. In its earliest application by the Romans, the A. did not spring from the entablature of the columns, but was generally placed behind them, and rested upon separate imposts. Subsequently, this arrangement was departed from, and the A. assumed the position which it has since retained above the columns; sometimes having an entablature interposed, and sometimes rising directly from the capital of the column or pier, as in the Romanesque. Before mentioning very briefly the different forms of the A., it seems natural to refer to a very simple structure, frequently met with in those early edifices in Britain which we are in the habit of designating as Saxon. It consists of two stones, their lower ends resting on rude piers, their tops leaning against each other, and thus forming two sides of a triangle, which is capable of supporting a moderate superincumbent weight. The mechanical principles on which the A. depends, though here very imperfectly employed, seem sufficiently called into play to suggest their more extensive application; and it is not impossible that out of this rude construction the A., in its later and more elaborate forms, might have developed itself without hints from foreign sources.

Of the A. itself, the following variations of form may be enumerated: The semicircle (1). the segment (2), the ellipse (3), which were the only forms employed by the ancients, and which alone were known in mediæval architecture before



1. Semicircle.

2. Segment.



3. Ellipse.

4. Stilted A.

5. Horseshoe A.

the time at which the pointed A. was introduced. Of these, the stilted A. (4), and the horseshoe A. (5), are modifications, in both of which the centre or point from which the A. is described is above the line of the impost, but in the former of which the moldings are continued downwards vertically; while in the latter they are slightly inclined inwards, or the curve is prolonged till it meets the impost. The horseshoe A. belongs peculiarly to Arabian architecture (q.v.), not only from its having originated simultaneously with the faith of the Prophet, but from its continuing to be used exclusively by his followers. Next, in point of time, though far surpass

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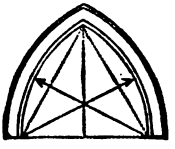
ing all the others in beauty and variety, is the pointed A., the origin of which is still a subject of antiquarian controversy. The greater or less acuteness of the pointed A. de-



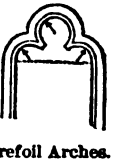
6. Equilateral A.

7. Lancet A.

8. Drop A.

9. Segmental A.

pends on the position of the two centre points from which its curved sides are described. Its various proportions will



10, 11, 12, Trefoil Arches.

be better understood from the accompanying diagrams (6, 7, 8, 9) than from any verbal description.

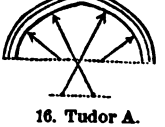
Of the foil arches (10, 11, 12, 13, 14), or arches in which

13. Cinquefoil A.

14. Polyfoil A.

the forms of a leaf are imitated, the first three are examples of the trefoil, the fourth of the cinquefoil, and the fifth of

15. Ogee A.



16. Tudor A.

the polyfoil, the latter being found in Arabian and Roman

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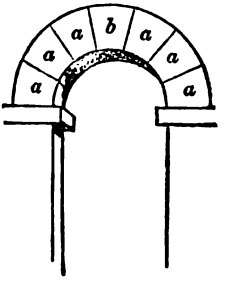
esque buildings. At a later period of Gothic architecture, with the decorated style, the ogee A. (15) was introduced, and the Tudor or four-cornered A. (16) appeared about the commencement of the perpendicular style. When first introduced, the proportions of this A. were bold and effective; but it was gradually depressed till the principle of the A. was lost, and its very form was again merged first in two and then in one flat stone or lintel over an opening. With the last form of the Tudor A. we thus reach almost the point of departure in the construction of the A., and complete our enumeration of its forms.



The sides of an A. are termed *haunches* or *flanks*, and its highest part is called the *crown*. The wedge-shaped stones, bricks, or other materials of which an A. is constructed are called *voussoirs* (*a*, *a*, *a*); the uppermost one of all (*b*) is called the *keystone;* the lowest, which is placed immediately over the impost, the *springer*, or springing-stone; the under or lower side of the voussoirs, the *intrados;* the upper side, the *extrados* or *back*. For the investigation of the mechanical principle of the arch, and of the conditions of stability, see Moseley's *Mechanical Principles of Engineering and Architecture*. See BRIDGE: IMPOST: PIER: BUTTRESS.

ARCH, TRIUMPHAL: a structure erected by the Romans across roads, or at the entrance of cities, in honor of victorious generals. The original triumphal A. was the Porta Triumphalis, one of the gates of Rome through which the triumphal procession entered the city. Among the earliest detached arches built at Rome was that built by Scipio Africanus (B.C. 190) on the Capitoline Hill. Under the emperors, these structures became numerous and magnificent, and were decorated with bass-reliefs and inscriptions. Three of what were properly triumphal arches still remain in Rome, those, namely, of Titus, Septimius Severus, and Constantine. Numerous similar monuments exist in other parts of the old Roman empire, as at Rimini, Susa, Verona, Ancona, Orange (in France), Capura (in Spain).

Triumphal Arch of Constantine at Rome.

ARCHÆAN PERIOD, in Geology: otherwise known

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as the Eozoic Era: the first system of rocks known to geologists. Although the Archæan rocks are the oldest known, they are not *primitive;* but, being stratified, are thus known to be sedimentary, the consolidated débris of still older rocks of which geologists know nothing. It is considered probable that these rocks were originally sands, clays, and limestones, later metamorphic: the sands being changed into quartzites, the clays into schists, gneiss, and even granites, and the limestones into marbles. It is noteworthy, however, that with these are associated two kinds of beds: iron ore and graphite. In Canada, the whole series of Archæan rocks is said to be as much as 40,000 ft. thick. It is a fact that the greatest beds of iron ore known in any strata are found in this system: thus the great iron-ore beds of Sweden, of Lake Superior, of New Jersey, and of the Iron Mountain of Missouri are in these rocks, as well as those immense ones recently discovered in s. Utah. The area covered by these rocks extends round the world, cropping out in some places as surface rocks, but mostly covered by the later formations. In N. Amer., it occupies in the n. a V-shaped space, and covers nearly the whole of Labrador, nearly all of Canada, enters New York at the Adirondacks, and extends n.w. into the Arctic regions. Another area includes the Blue Ridge and the e. slope of the Appalachian range extending from New England to Georgia. Involved in this system are the axes of certain of the other great mountain ranges, as the Colorado, Park, and Wahsatch, and possibly the Sierra Nevada. There are also some isolated instances, including one in Texas and one in Missouri. In Europe these rocks are found in the n.w. of Scotland; in Norway, Sweden, and Russia; in Bohemia and Bavaria, and among the Alps and the Carpathians. From the fact that these rocks are stratified, it is known that they were all at one time covered with water. There is reason to believe that they contained the lowest forms of vegetable and animal life, though this has never been demonstrated. The enormous thickness of the Archæan rocks, they being probably equal to all later rocks together, represents an amount of time perhaps equal to all the rest of the recorded geological history of the earth. See EOZOON.

ARCHÆOCIDARIS, n. *âr'kē-ō-sĭd'âr-ĭs* [Gr. *archaĭ'os*, ancient: Gr. *kid'aris:* L. *cid'aris*, a turban]: the sea-egg; a genus of fossil sea-urchins characterized by their small hexagonal plates and long spines.

ARCHÆOLOGY, n. *âr'kē-ŏl'ŏ-jĭ*, or ARCHAIOLOGY, n. *âr'kē-ŏl-ō-jĭ* [Gr. *archaĭ'os*, ancient; *logos*, discourse]: the science that treats of ancient things or antiquities; knowledge about ancient art, particularly of the middle ages. AR'CHÆOL'OGIST, n. one skilled in ancient things and learning. ARCHÆOLOGICAL, a. *âr'kē-ō-lŏj'ĭ-kăl*, pertaining to. AR'CHÆOLOG'ICALLY, ad. *-lĭ.*

ARCHÆOL'OGY: name now generally given to the study formerly known as that of 'antiquities.' The term is well understood, although its meaning is not definitely fixed. In its widest sense, it includes the knowledge of the

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origin, language, religion, laws, institutions, literature, science, arts, manners, customs—everything, in a word, that can be learned of the ancient life and being of a people. When so used, it comprehends more or less of several branches of knowledge recognized as distinct or independent pursuits, such, for example, as ethnology, philology, history, chronology, biography, mythology, numismatics. In its narrower but perhaps more popular signification, A. is understood to mean the discovery, preservation, collection, arrangement, authentication, publication, description, interpretation, or elucidation of the materials from which a knowledge of the ancient condition of a country is to be attained. These materials will be found to divide themselves into three great classes: (1) written, (2) monumental, and (3) traditional. 1. What may be called written A., may be again subdivided into palæography (q.v.), or diplomatics (q.v.)—that is, the science of ancient writings; and bibliography (q.v.) or the knowledge of printed books. 2. Monumental A. admits of almost endless subdivisions, according to the character of the remains to be studied, which may be works of art, such as buildings, sculptures, paintings, engravings, inscriptions, coins, medals, seals, armorial bearings, tapestry, furniture, plate, jewels, enamels, glass, porcelain, pottery; works of engineering, such as roads, canals, mines, piers, camps, forts, walls; works of unskilled labor, such as pillars of unhewn stone, caves, dikes, ditches, mounds of earth or stone; articles of dress, armor, or personal ornament; tools, weapons, implements, utensils, machines; appliances for locomotion, such as canoes, boats, ships, carriages; modes of sepulture, such as mummies, sarcophagi, urns, catacombs, graves; vestiges of man and animals, such as skulls, bones, skins. 3. Traditional A. includes as well the unwritten language and oral literature of a people, their dialects, legends, tales, proverbs, rhymes, songs, and ballads, as those sports, customs, ceremonies, rites, and superstitions now beginning to be known by the name of 'folk-lore,' and formerly called 'popular antiquities.'

The study of A. in modern Europe may be held to date from the revival of letters. It was long almost exclusively confined to the antiquities of the Greeks and Romans. About the middle of the 16th c. Mediæval A., or the antiquities of the dark and middle ages, began to be cultivated. Egyptian A., or 'Egyptology,' as it is sometimes called, made comparatively little progress until the discovery of the Rosetta Stone, containing a bilingual and triliteral inscription, which enabled Young in 1819, and Champollion in 1821, to find a key to the hieroglyphics. The more recent discoveries of Botta, Layard, Rawlinson, and others, have already advanced Assyrian A. to a point beyond all expectation. Indian A. has been successfully prosecuted, especially during the last forty years, chiefly by officers of the East India company. Something also has been done by them and others for Chinese A. In the United States much study has been given to the mysterious remains of the aboriginal inhabitants of N. America. The A. of Central and S.

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Amer., as it attracted attention much earlier, so its more stately and instructive monuments have much better rewarded such investigations as those of Lord Kingsborough, Messrs. Stephens and Catherwood, and others.

The study of A. has been largely promoted by the publication, at the expense of the state, in various countries, of the national chronicles, charters, and records; by societies and clubs contributing to the same end, or printing essays on questions of A.: and by the establishment by the state, by associations, or by individuals, of museums for the collection and classification of antiquities. In England, a society for promoting the study of antiquity was founded in 1572. The irrational jealousy of the government dissolved it in 1604. It was revived in 1707, enlarged in 1717, and incorporated by royal charter in 1751, under the name of the 'Society of Antiquaries of London.' An attempt to institute a similar society in Scotland was made about 1700 by 'some honorable and knowing gentlemen.' But it was not until 1780 that the Society of Antiquaries of Scotland was incorporated by royal charter. The Royal Irish Academy for promoting 'the study of science, polite literature, and antiquities,' was chartered in 1786. The Society of Antiquaries of Scotland and the Royal Irish Academy have good museums of national antiquities. The British Museum in London (established 1753), besides a great collection of early manuscripts and printed books, has galleries of Assyrian, Egyptian, Etruscan, Greek, Roman, British, and Mediæval antiquities. One of the most remarkable collections of antiquities on the continent is that of the Royal Society of Antiquaries of the North, at Copenhagen, arranged so as to illustrate a favorite theory of the Scandinavian archæologists—that the primitive antiquities of a country may be assigned to three successive ages or periods of stone, bronze, and iron, with as much certainty and precision as the comparative antiquity of geological strata, or periods of the world's creation, may be determined by the fossils which they are found to contain. The museums of the Louvre and the Hôtel de Cluny, in Paris, contain fine collections of Assyrian, Egyptian, Greek, and Roman antiquities, and an unrivalled collection of Mediæval antiquities. The Royal Museum at Naples has gathered together the statues, paintings, vases, household utensils, and other objects recovered during the last hundred years from the ruins of Herculaneum and Pompeii.

ARCHÆOPTERYX, n. *ár'kē-ŏp'tér-ĭks* [Gr. *archaĭ'os*, *pterux*, a wing]: a unique specimen of fossil bird remains—now in the British Museum, constituting the ord. *Saur'uræ*, having remarkable reptilian affinities. See SOLENHOFEN A later, more perfect specimen is in the Yale collections.

ARCHAISM, n. *ár'kā-ĭzm* [Gr. *archaĭ'os*, ancient—from *archē*, beginning]: an ancient expression, or one not now used. ARCHAIC, a. *ár-kā'ĭk*, or ARCHA'ICAL, a. *-ĭ-kăl*, ancient; peculiar to remote antiquity; obsolete.

ARCHANGEL, n. *árk-ān'jĕl* [Gr. *archang'gelos*, an archangel—from *archos*, a chief; *ang'gĕlos*, a messenger]: an

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Remains of Archæopteryx in Solenhofen Stone

Archer-fish (*Toxotes jaculator*).

Archer-fish (*Toxotes jaculator*). Another specimen.

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angel of the highest order. ARCH'ANGEL'IC, a. *-jĕl'ĭk*, pertaining to. *Note.*—Most of the other words beginning with *arch* are to be looked for under the simple words; ARCH always meaning *chief, of the first class*—as ARCHBISHOP, the chief bishop.

ARCHANGEL, *ärk-ān'jĕl*: the chief city in the Russian dept. of Archangel; in lat. 64° 32′ n., and long. 40° 33′ e., about 40 m. above the junction of the river Dwina with the White Sea; the seat of an archbishop. Its name is taken from the monastery of St. Michael. A. is the chief commercial city for the n. of Russia and Siberia, and is visited by numerous vessels—especially British—from July to September, the port being clear of ice only during that period. The houses are built chiefly of wood, and their general appearance is far from handsome. The finest edifices are the bazaar or mart, and the marine hospital. A. has an ecclesiastical college with nine professors, schools for engineering and navigation, etc. The chief articles of traffic are fish, train-oil, skins, furs, timber, wax, iron, tallow, bristles, caviare. The town, which is the oldest seaport of the empire, and was for a long period the only one, was founded in 1584. During summer, A. has a continual market. Pop. (1893) 19,936.

The government of A. has an area of 331,505 sq. m.; pop. (1893) 354,411.

ARCHAN'GEL: a term which occurs in the New Test.; and which, according to some, is there a title of our Saviour—but is usually considered to designate an angel superior in power and glory to the other angels. We read in the Epistle of Jude of 'Michael the A.,' and in Rev. xii. 7, of 'Michael and his angels.' In 1 Thess. iv. 16, we are told that the coming of our Lord at the last day shall be 'with the voice of the A., and with the trump of God.' We nowhere read in the Holy Scriptures of *archangels*, although the plural is popularly as much used as the singular. The notion of an angelic hierarchy certainly prevailed among the Jews, the highest place being assigned to Michael; and the same notion has extensively prevailed in the Christian Church. There are passages of Scripture which seem to indicate different degrees and classes among the angelic hosts, but no clear revelation has been made upon this subject. See ANGELS.

ARCHANGEL, NEW: see SITKA.

ARCHBISHOP, *ärch-bĭsh'ŏp* [Gr. *arch*, and *episcopos*, overseer]: the title given to a metropolitan bishop who superintends the conduct of the suffragan bishops in his province, and also exercises episcopal authority in his own diocese. The title arose in the 3d and 4th centuries, from the provincial synods being held once or twice a year in the chief town of the province under the presidency of the bishop of the place. Another cause of the origin of the title is said to be the custom of planting new bishoprics as Christianity spread, a slight supremacy being still retained by the original over the newly appointed chief pastors. In the Oriental Church, the archbishops are still called 'metropolitans,

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from the circumstance first mentioned. In the African Church, on the other hand, the term used was 'primus.' The great archbishoprics of the early church were those of Jerusalem, Antioch, Ephesus, Alexandria, Constantinople, and Rome. Since the 6th c., the A. of Rome has assumed the name of pope (papa). There is an official letter by Justinian, addressed to 'John, A. of Rome and Patriarch'; and several ecclesiastical constitutions are addressed to 'Epiphanius, A. of Constantinople and Patriarch.' The synod of Antioch, 341, assigned to the A. the superintendence over all the bishoprics, and a precedence in rank over all the bishops of the church, who, on important matters, were bound to consult him and be guided by his advice. By degrees there arose out of this superiority of rank privileges which at length assumed the character of positive jurisdiction in ecclesiastical matters. Many of these rights passed to the patriarchs (q.v.) towards the end of the 4th and during the 5th centuries, and still more to the pope in the 9th. The archbishops still retained jurisdiction, in the first instance, over their suffragans in matters which were not criminal, and over those who were subject to them they acted as a court of appeal. They possessed also the right of calling together, and presiding in, the provincial synods; the superintendence and power of visitation over the bishops of the metropolitan see; the power of enforcing the laws of the church; the dispensation of indulgences, and the like. The archbishops further enjoyed the honor of having the cross carried before them in their own archiepiscopate, even in presence of the pope himself, and of wearing the *pallium*. In England, there are two archbishops of the Church of England, of whom one has his seat at Canterbury, the capital of the ancient kingdom of Kent; the other at York, the capital of Northumbria. But though, as ruling over a province in place of a single diocese, both have held the rank of metropolitans from the first, the A. of Canterbury has all along had precedence, not merely as the successor of Augustine and the senior A., but as possessing a pre-eminent and universal authority over the whole kingdom. This pre-eminence is marked in the titles which they respectively assume—the A. of Canterbury being styled the primate of all England (*metropolitanus et primas totius Angliæ*), while the A. of York is simply called primate of England (*primas et metropolitanus Angliæ*). It is also indicated by the places which they occupy in processions—the A. of Canterbury, who has precedence of all the nobility, not only preceding the A. of York, but the lord chancellor being interposed between them. Previous to the creation of an archbishopric in Ireland the authority of the A. of Canterbury extended to that island. The amount of control which belongs to an A. over the bishops of his province is not very accurately defined; but if any bishop introduces irregularities into his diocese, or is guilty of immorality, the A. may call him to account, and even deprive him. In 1822, the A. of Armagh, who is primate of all Ireland, deposed the Bishop of Clogher on the latter ground. To the A. of Canterbury belongs the honor of placing the crown on the sovereign's

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head at his coronation; and the A. of York claims the like privilege in the case of the queen-consort, whose perpetual chaplain he is. The province of the A. of York, consisting of the six northern counties and Cheshire, includes 9 dioceses. The rest of England, with Wales, forms the province of the A. of Canterbury, and includes 24 dioceses. The dioceses of the two archbishops—i.e., the districts in which they exercise ordinary episcopal functions—were remodelled by 6 and 7 Will. IV. c. 77. The diocese of Canterbury comprises Kent, except the city and deanery of Rochester, and some parishes transferred by this act; a number of parishes in Sussex called 'peculiars;' with small districts in other dioceses, particularly London. The diocese of the A. of York embraces the county of York, except that portion of it now included in the dioceses of Ripon and Manchester, and some other detached districts.

In Ireland, there are two Protestant and four Roman Catholic archbishops. Of the former, the A. of Armagh is primate of all Ireland; the A. of Dublin being primate of Ireland. They formerly sat alternately in the house of lords; the three bishops who, with them, represented the Church of Ireland being chosen by rotation. The election of an A. does not differ from that of a bishop (see BISHOP); but when he is invested with his office, he is said to be 'enthroned,' whereas a bishop is 'consecrated.' He also writes himself 'by Divine Providence'; a bishop being 'by Divine permission'; and has the title of 'Grace,' and 'Most Reverend Father in God,' while a bishop is styled 'Lord,' and 'Right Reverend Father in God.' The A. is entitled to present to all ecclesiastical livings in the disposal of diocesan bishops, if not filled up within six months; and every bishop, whether created or translated, was formerly bound to make a legal conveyance to the A. of the next avoidance of one such dignity or benefice belonging to his see as the A. shall choose.

In the Prot. Epis. Church in the United States, there are no archbishops. There are in the United States 14 archbishops of the Rom. Cath. Church.

ARCHDEACON, *ärch-dē'kŭn* [Gr. *arch*, and *diaconos*, servant]: an ecclesiastical dignitary whose jurisdiction is immediately subordinate to that of the bishop. The A. originally was simply the chief of the deacons, who were the attendants and assistants of the bishop in church affairs. His duties consisted in attending the bishop at the altar and at ordinations, assisting him in managing the revenues of the church, and directing the deacons in their duties. From being thus mere assistants, archdeacons in the 5th c. began to share the bishop's powers, and step by step attained to the authority which they now enjoy, which from the 9th c. became in many respects distinct from that of the bishop. Several synods protested against the innovation, but it was continued in the 11th and 12th centuries, when the archdeacons were recognized as the most influential of prelates. In the 13th c., their powers were limited by the establishment of episcopal courts. Their dignity and influence is now very much reduced in the Rom. Cath. Church. There were formerly 60 archdeaconries in England, but their

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number has been considerably increased since the passing of the act for carrying into effect the report of the Ecclesiastical Commissioners (6 and 7 Will. IV. c. 77); and it is probable that under the provisions of that act they may be still further increased. No person can be appointed an A. till he has been six years complete in priest's orders (3 and 4 Vict. c. 113, s. 27). The duty of parochial visitation has long been regarded as belonging specially to the archidiaconal office, and it was by its exercise mainly that the archdeacons attained to the dignity of ordinary instead of delegated jurisdiction. Even in performing this function, however, and in holding general synods or visitations, ordering repairs of churches, and the like, the A. is properly to be regarded as being what the canon law called him, 'the bishop's eye.' The judge of the A.'s court, when he does not preside, is called 'the official.' There is an appeal to the Court of the Bishop, or in the case of an A. of an archbishopric, to the Court of Arches. See DEACON: DEAN: PRIEST. See also Cripp's *Law Relating to the Church and Clergy*.

ARCHDUKE': a title now taken by all the sons (Archduchess by all the daughters) of the emperor of Austria, and by their descendants through the male line. The title of A. was gradually assumed by the dukes of Austria, as a mark of precedence over the other dukes of the empire. Duke Rudolph IV. of Austria, in 1359, called himself Palatinus Archidux, but he was not so styled by the emperor. His brothers, Albert and Leopold, did not assume the title after his death, though they had occasionally done so in his lifetime. The third son of Leopold, however, Ernest the-Iron, revived it. Still he was addressed by the emperor simply as duke. At last the title was formally conferred on them by the emperor Frederick III. in 1453, who himself, as duke, was the first recipient of the imperial gift. Still the usage was not uniform, for he afterwards speaks of himself as duke. The privilege was extended to the Tyrolian branch of the Austrian House in the person of Sigismund. The value of the dignity thus assumed was a cause of contention with Bavaria in 1589. The Austrian view was, that to duke it held the same relation that archbishop does to bishop. The dukes of Austria claimed to have always had precedence over the other ducal houses, and regarded the title as a mere indication of what had been universally acknowledged. Bavaria, on the other hand, relied on the greater antiquity of its dukedom. The contest was decided by the emperor Rudolph II. in favor of Austria, the precedence of which has not since been called in question. Other dukedoms claimed the privilege of being so called, but it was invariably denied by the emperor.

ARCHEGONIUM, n. *ár'kē-gō'nĭ-ŭm* [Gr. *archē*, beginning; *gonē*, seed, generation]: the female organ of sexual reproduction in mosses, ferns, etc.

ARCHEGOSAURUS, n. *ár'kē-gō-saw'rŭs* [Gr. *archēgos*, founder, or *archē*, beginning; *saurus*, a lizard]: a remarkable fossil Batrachian, but so named by Goldfuss, as constituting the real beginning of reptilian life, which had previously

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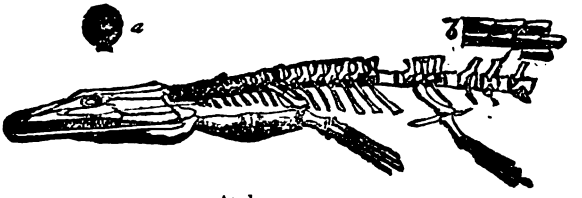
been considered as not extending below the Permian series of rocks.

From the engraving, it will be seen that the head of the



Archegosaurus:
a, section of a tooth; *b*, scales.

A. is protected by a firm dermal skeleton, composed of numerous plates, while the internal primary cartilage seems to have continued unossified. The skull is flattened and triangular, with rounded angles, the front one being somewhat lengthened. The teeth are simple cones, having a labyrinthic structure similar to that of the recent *Lepidosteus*. The vertebral column remains in an embryonic condition; the arches and peripheral elements of the vertebræ are ossified; but the *chorda dorsalis*, which is persistent, is unprotected below. The ribs are short and almost straight, round and slender in the middle, expanded and flattened at the ends. The two pairs of limbs are nearly equal in size, and in structure very much resemble those of the *Proteus*. They have each four long, slender digits, which obviously supported a longish, narrow-pointed paddle, adapted for swimming. Externally, the body was protected by a covering of oblong quadrangular scales, which have been preserved in some specimens.

Four species have been described.

The history of the A. is shortly this: Its remains, found in the Bavarian coal-measures, had been described as those of a fish under the name of *Pygopterus Lucius* (Agassiz). In 1844, H. von Meyer first described it under the name of *Apateon pedestris*. This specimen was found in the coal measures of Münster-Appel, in Rhenish Bavaria, and was supposed by Meyer to be related to the salamanders, and yet not without considerable doubt· for he says: 'Its head might be that of a fish, as well as that of a lizard, or of a batrachian.' In 1847, Goldfuss figured and described three distinct species discovered in large concretionary nodules of clay-ironstone, from the coal-field of Saarbrück, giving to them the generic name of A. He considered them to be a transition state between the fish-like batrachia and the lizards and crocodiles. Professor Owen has subsequently described this fossil; he makes it a remarkable connecting link between the reptile and the fish, and on these grounds: It is related to the salamandroid-ganoid fishes by the conformity of pattern in the plates of the external cranial skeleton, and by the persistence of the *chorda dorsalis*, as in

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the sturgeon, while it is allied to the reptiles by the persistence of the *chorda dorsalis*, and the branchial arches, and by the absence of the occipital condyle, or condyles, as in *Lepidosiren*, and by the presence of labyrinthic teeth, as in *Labyrinthodon*, which, however, also ally it to the ganoid *Lepidosteus*. There is thus in the A. a blending together of the characteristics of reptile and fish in one animal. It occupies a position between, and equally related to, the salamandroid-ganoid fishes on the one hand, and the labyrinthodont reptiles on the other, while the latter lead through the *Lepidosiren* to the perennibranchiate batrachia

ARCHELAUS, *âr'kē-lā'ŭs:* one of the Heraclidæ, who when driven by his brothers from his native land, fled to Macedon, where he became the founder of a powerful family, of which Alexander the Great was said to be a descendant.

ARCHELAUS: natural son of the Macedonian king, Perdiccas II., came to the throne (after he had murdered the rightful heir) in B.C. 413. His reign was far better than its commencement, as he introduced several salutary measures, and was a generous patron of art and literature. Euripides and Zeuxis frequented his court; and the palace of the monarch was splendidly adorned by the paintings of the latter. It is said that Socrates refused an invitation to proceed thither, having no great respect for the character of A., which was stained with odious vices. He is believed to have been murdered by Craterus, one of his favorites; but the story of his death is told differently.

ARCHELAUS: a general under Mithridates the Great, was sent into Greece with a large fleet and an army of 120,000 men to oppose the Romans B.C. 87. Sulla was sent against him, and besieged him in Piræus, whence A. moved to Bœotia, and here collected all his forces. A battle took place at Chæroneia, when victory declared for the Romans. A. now retreated to Chalcis, where he waited until Mithridates had despatched another army of 80,000 men into Greece. The second fight took place at Orchomenos, in Bœotia, and after two days' contest the whole host led by A. was totally routed by Sulla. A., after hiding for three days in a morass, escaped to Chalcis. After a treaty of peace had been effected between Sulla and Mithridates, A. fell under the displeasure of his monarch, being unjustly suspected of treason, and fearing for his life, as also perhaps disgusted at the return he had received for his many services, he went over to the Romans at the outbreak of the second war, B.C. 81. After this time, he appears no more in history.

ARCHELAUS: son of the former, married Berenice, daughter of King Ptolemæus Auletes (B.C. 56), and ruled over Egypt for the short space of six months during the banishment of Ptolemæus. The usurper lost his life in a battle against Aulus Gabinius, proconsul of Syria. His grandson, also named A., obtained from Marcus Antonius the prov. of Cappadocia, and retained it during the reign of Augustus. Tiberius accused him of political innovations,

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and condemned him to death; but, as he was old and fatuous, his life was spared. He died soon after his trial, at Rome, A.D. 17.

ARCHELAUS: son of Herod, the tyrant of Judæa, succeeded his father in A.D. 1, and maintained his position against an insurrection raised by the Pharisees. His heirship to the throne being disputed by his brother Antipas, A. went to Rome, where his authority was confirmed by Augustus, who made him ethnarch of Judæa, Samaria, and Idumæa. After a reign of nine years, he was deposed by Augustus, on account of his cruel tyranny, and banished to Vienna, in Gaul, where he died. His territories were added to the Roman province of Syria.

ARCHENCEPHALA, n. plu. *ăr'kĕn-sĕf'ă-lă* [Gr. *archo*, I rule, I reign over; *engkephălē*, the brain]: Owen's fourth and highest group of Mammalia, comprising *Man* alone.

ARCHENHOLZ, *ăr'kĕn-holts*, JOHANN WILHELM, Baron von: 1745, Sept. 3—1812, Feb. 28: a German author. After service in the army, he gained his discharge at the close of the Seven Years' War, and passed several years in travel, visiting almost all the principal cities of Europe, and supporting himself by authorship, and, as it was generally reported, also by gambling. He wrote a *History of the Seven Years' War* (2 vols., Berlin, 1793), which when compared with the generally dry style of his German contemporaries deserves praise on account of its narrative interest. He also wrote *England and Italy* (2d ed., Leip. 1787), *Annals of British History* (1789-98), and biographies of Queen Elizabeth of England and Gustavus Vasa of Sweden.

ARCHEOLOGY, etc.: see ARCHÆOLOGY.

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ARCHER, n. *árch-ér* [F. *archer;* OF. *archier*, a bowman, —from mid. L. *árcārĭus*, an archer: F. *arche*, an arch—from mid. L. *archĭa*, an arch; L. *arcus*, a bow]: one who uses or is skilled in the use of the bow. ARCHERY, n. *árch·er·ĭ*, the art of using the bow. Archers are soldiers whose weapons are the bow and arrow. Among the ancients specially eminent in this mode of warfare, we may particularize the Thracians, Cretans, Parthians, and Numidians; among the moderns, the Arabians, Germans, and Saracens. The emperor Frederick II. employed Saracenic archers with great effect in his Lombard campaign; and to them is ascribed the victory at Cortenuova in 1237. The archers belonged to the light troops, and their province was to open the battle. The emperor Leo especially lauded the dexterity of the Arabian archers. In later ages, the bow came to be employed in England, where the archers wore light armor, a short sword, and a quiver with twenty or more arrows. At first, these archers fought in small groups; in later years, in large masses. At the battle of Cressy, they formed in divisions of 4,000 men, 200 in line and 400 deep. The archers decided the fate of the day in several battles—such as Cressy and Poitiers (1356), Agincourt (1415), Crévaut (1423), Verneuil (1424), and Rovernay (1429). The French archers never equalled the English, in spite of the endeavors of Charles VI. and Charles VII. The latter organized in 1448 the *Franc-archers*, to which corps every parish had to contribute one man; but this measure was attended with so little success that the king was induced to take Scottish archers into his pay, to make any head against the English. The French archers wore a coat of buffalo-hide lined with strong linen, and were accompanied by shield-bearers. In this manner 2,000 bowmen with their shield-bearers fought under the Count de Foix at the siege of Bayonne in 1451. The archers universally belonged to the *élite* of the troops, and received higher pay than the rest. At one period, the arbalest or crossbow was more in favor than the long-bow. See ARBALEST. Long after the discovery of gunpowder, the bow and arrow were still used; as, for example, at the siege of Capua in 1500; and the siege of Peineburg in 1502. Even in 1572, Queen Elizabeth promised to place at the disposal of Charles IX. 6,000 men, of whom the half were archers. The English archers are the subject of frequent mention by our old writers. Chaucer, in his *Canterbury Tales*, speaks of the archer

> 'Cladde in cote and hode of grene,
> A sheafe of peacock arwes brighte and kene,
> Under his belt he bare ful thriftilie.
> Wel coude he dresse his takel yewmanlie,
> His arwes drouped not with fetheres lowe,
> And in his hand he bare a mighty bowe.'

In a Treatise on Martial Discipline, by Ralph Smithe, written in the time of Queen Elizabeth, we have a picture of the English archer two centuries after Chaucer's time: 'Captens and officers should be skillful of that most noble weapon the long-bow; and to see that their soldiers, according to their draught and strength, have good bowes, well

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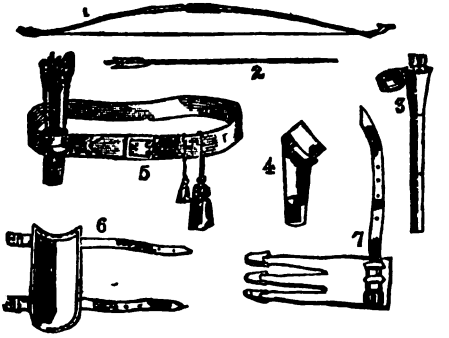
nocked, well strynged, everie strynge whippe in their nocke, and in the middles rubbed with wax bräser, and shuting-glove, some spare strynges trymed as aforesaid; every man one shefe of arrows, with a case of leather defensible against the rayne, and in the same four-and-twentie arrowes, whereof eight of them should be lighter than the residue, to gall or astoyne the enemye with the hailshot of light arrowes before they shall come within the danger of their harquebus shot. Let every man have a brigandine or a little coat of plate, a skull or hufkyn, a maule of leade of five foote in lengthe, and a pike, and the same hanging by his girdle with a hook and a dagger.'

Among the Asiatic Turks, the Persians, the Tatars, and other nations of the East, as well as the American Indians, the bow and arrow are still used as weapons of war. In Europe, they are nearly abandoned for military purposes. The chief differences between the two kinds of weapon employed by the archers of the middle ages are noticed under ARBALEST: BOW AND ARROW.

Archery as an out-door exercise or pastime has in recent years been much practiced in England and the United



Archery Apparatus.

States. During the reign of Charles II., archery was patronized by the court, Tothill Fields being the chief scene of exercise. After his reign, archery fell into disuse for about a century. In 1776, a Mr. Waring revived archery in the neighborhood of London; and very shortly there were several toxophilite or archery societies formed. The system survived till 1798, when another period of inactivity supervened, lasting till 1844. In this last-named year, archery was revived in Yorkshire, and has since extended. A recommendation to the sport is that ladies can take part in it. In the modern exercise of archery, there are several varieties of contests between the antagonistic parties; but the usual variety is target-shooting. In archery-matches, a number of prizes are generally awarded, the principal being for the greatest number of arrows shot into any part of the

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target, and for the nearest approach to the exact centre. The target has a gold spot in the centre, a red ring around this, then a blue ring, then a black, and outside of all a white ring bordered with green. The merit of the shooting consists in the near approach to the exact centre or 'gold.' Two targets are generally used in a match, on opposite sides of the field, each by one party. The apparatus mostly used at these archery meetings is represented in the cut on page 425. 1 is the bow, varying in weight according to the strength of the person who is to use it; 2 is the arrow; 3 is the quiver, a tin case for holding arrows not immediately in use; 4 and 5 are the pouch and belt for holding the arrows actually in use. The tassel of the belt serves to clean the arrows when dusty. 6 is the brace buckled round the left arm, to protect it from being hurt by the string when shooting; 7 is the shooting-glove, formed to protect the three fingers used in drawing the string. Besides these articles and the target, archers are sometimes provided with a large case called an 'ascham,' fitted up with the necessary drawers and compartments for the reception of the bow, arrows, string, and other necessary accoutrements.

In archery competition, the total number and value of each person's hits are registered on a scoring-card. The shots are usually punctured on a card with a pin, as being preferable to pencil or ink marks; and the mode of ascertaining the value of the hits, which is increased in proportion as they reach the centre, will be seen by the following example:

FORM OF THE SCORING-CARD.

Names.	Gold.	Red.	Blue.	Black.	White.	Total.	Value.
A	..	....	..... .	....	....	35	119
B	.	..	....	..... .	....	26	90

It appears by the card that A has two in the gold, four in the red, six in the blue, ten in the black, and thirteen in the outer white, making a total of 35. The real value of these is ascertained by multiplying the hits in the gold by nine; in the red, by seven; in the blue, by five; in the black, by three; and by leaving without alteration the number in the white or outer. By this process it will appear that A's numbers, according to the *value* of each circle, amount to 119, and B's to 90—hence A is the winner by 29. But A's *total* might have been less than B's, and still he might have been the winner, provided the shots had lain more towards the gold than B's.

As an instance of the skill which long and careful practice may insure, Mr. Horace A. Ford, who has written an excellent work on Archery, on one occasion, out of 144 shots, made 143 hits—765 score; on another, 144 shots, 137 hits—809 score; and on another, 75 shots, 75 hits—555 score.

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ARCHER FISH: a name given to certain small East Indian fishes of the Acanthopterygious family of *Squamipennes* or *Chætodontidæ*, which have the faculty of projecting drops of water with sure aim at insects, and thereby causing them to fall into the water, where they are instantly seized as prey. *Toxotes jaculator*, one of these species, is a fish about six or seven inches in length, a native of Java and other parts of the Indian archipelago, and is that to which the name A. F. has been more strictly appropriated. It can project a drop of water to the height of four or five feet. It is the only known recent species of its genus, but there is a fossil one. *Chelmon rostratus*, also a Javanese fish, possesses the same power, and the Chinese in Java keep it in jars for their amusement, causing it to practice its art by placing insects within its range.

ARCHETYPE, n. *âr'kĕ-tīp* [F. *archétype:* L. *archĕtypum:* Gr. *archĕt'upŏn*, an original—from Gr. *archē*, beginning; *tupos*, form]: the original or model from which copies are made; an ideal primitive type; a pattern. ARCHETYPAL, a. *âr'kĕ-tī'păl*, original.

ARCHI-EPISCOPAL, ARCHIDIACONAL, etc.: see under ARCH 3.

ARCHIGRAPHER, n. *âr-kĭg'ra-fĕr* [Gr. *archos*, chief; *graphein*, to write]; a chief secretary.

ARCHIL, n. *âr'kĭl* or ORCHIL [OF, *orcheil; orseille*—from Sp. *archilla:* origin undetermined]; a coloring substance obtained from various species of lichens. The A. is not originally present in the lichens, but is developed during a process of putrefaction and fermentation. The lichens, collected from rocks near the sea, are cleaned, ground into a powder with water placed in tanks, and ammoniacal liquids—such as purified gas liquor or stale urine—added, when by the combined influence of the ammonia, air, water, and the constituents of the lichens, a violet-colored matter is generated, which appears for a time to dissolve in the water, but finally falls to the bottom of the vat in the condition of a moist powder or paste. The latter is then mixed with some substance like chalk or stucco to give it consistence. The lichens which yield the best A. in largest quantity are *Ikoccella tinctoria* and *fuciformis*. The former is called the *Archil* plant, and is obtained in large amount from the Canaries and Cape de Verd Islands, and the Levant. Another lichen, *Lecanora tartarea*, is collected from rocks in Sweden, and largely exported. It is sometimes called cudbear (q.v.), or cudbear lichen, and sometimes white Swedish moss. A. is soluble in water and in alcohol, to either of which it imparts a violet color, with much of a crimson hue. It is much employed in the dyeing of silks, where a beautiful lilac color is required; but though a brilliant rich hue is imparted to the silken fabric, the color is not permanent, being easily acted upon by the rays of the sun. Hence the A. is seldom used by itself, and the cloth is first dyed lilac by another coloring matter, and is then passed through an A. dye, which imparts a brilliant lilac hue to the cloth. A. is seldom employed

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to dye cotton cloth, but it is often used, with indigo, in the dyeing of woolen cloth, and besides enabling the indigo color to go much further, it imparts its peculiar rich tint to the blue or black cloth or yarn immersed in it; the color, however, so obtained is not so permanent as where the A. is left out. Cudbear (q.v.) and Litmus (q.v.) are analogous to A., and are obtained from the same lichens.

The lichen distinguished by the name of the A. plant or lichen, *Roccella tinctoria*, grows very sparingly on the southern coasts of England, but abundantly on the shores of the Mediterranean and of the neighboring parts of the Atlantic, where it often covers rocks near the sea, so as to form what has been likened to a sort of turf upon them. The Spanish name is *Orchilla*, from which the French *Orseille*, the English A. or Orchil, and (as has been thought) even the botanical name *Roccella*, are derived. It is of a substance between cartilaginous and leathery, roundish, somewhat erect, branching in a dichotomous manner, of a grayish brown color, with powdery warts (*soredia*); the *apothecia* (q.v.) orbicular, flat, horny, almost black, with a scarcely prominent border. That from the Canary Isles is generally regarded as the best. It seldom exceeds the thickness of a pin, and about an inch and a half in length. A less branched and more slender, prostrate, or pendulous variety (*Roccella hypomecha* of Bory de St. Vincent) is common at the Cape of Good Hope and in the island of Mauritius, and appears in commerce with the other, but is inferior. A variety remarkable for its large size, or perhaps a distinct species (*R. flaccida*), is brought from Lima and other parts of the w. coast of South America; it is sometimes as thick as a goose quill, and 6 or 8 inches long, and is of excellent quality. All those, and *Roccella fuciformis*, very generally receive in commerce, and from archil-makers, the name of Orchella weed, the different kinds being distinguished according to the countries from which they are imported. They are also popularly called Dyer's Moss.—*R. fuciformis* now yields perhaps more of the A. or Orchella weed of commerce than *R. tinctoria*. It differs from *R. tinctoria* chiefly in being not rounded, but flat, and in having the *apothecia* very distinctly bordered. It grows in similar situations, and is also a native of Britain, but abundant only in warmer climates, as on the coast of Africa, Madagascar, etc. That from Angola is reckoned the very best.

Among the lichens from which A. is manufactured is the *Parelle d'Auvergne* or *Orseille de terre* (Ground A.) of the French, *Variolaria orcina* or *corallina*, which is gathered for this purpose in mountainous districts of the s. of France and other parts of the s. of Europe, and is also an article of export (with other similar lichens) from Sweden to Holland. But the greater facility with which A. of the finest quality can be procured from the species of *Roccella*, and the increasing abundance of the supply from different quarters, particularly from Angola, tend to diminish the demand for other lichens.

ARCHILOCHUS, *ăr-kĭl'ō-kŭs*, OF PAROS, in Lydia: abt. B.C. 714–676: regarded as the first of the Greek lyric poets,

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although the origin of the elegy is claimed for Callinus, a writer whose age seems to have slightly preceded that of A. Glimpses of his life, especially of the calamities that befell him, were frequently given in his writings. His father's name was Telesicles, his mother was a slave called Enipo. At an early age, becoming entangled in political contests, he abandoned his native town, and led a colony of the citizens to Thasos. While here, as he informs us in some extant verses, he lost his shield in a battle against the Thracians, yet not through cowardice. Subsequently he was banished from Sparta, to which he had gone, some say because he had vindicated his conduct in running away from the fight, others because of the licentiousness of his verses. He is said to have gained the laurel wreath at the Olympic Games by an ode in honor of Hercules, but this is doubtful. Having returned to Paros, he took part in the war which broke out between it and Naxos, in the course of which he lost his life, either in battle or by assassination. The Delphian oracle pronounced a curse upon his slayer. Variety, novelty, and satirical bitterness characterized his lyric poems; so much so, that 'Archilochian bitterness' and 'Parian verse' became by-words in ancient times. He scourged his enemies in the most merciless fashion, and always displayed the most malicious skill in selecting for his sarcasm the points on which they were most sensitive. It is said that Lycambes, who had promised his daughter Neobule in marriage to A., having failed to fulfil the promise, was so severely satirized by the poet, that to escape ridicule both father and daughter hanged themselves. Among the ancients, A. was ranked with Homer. They dedicated the statues of both on the same day, and placed the head of A. beside that of Homer on the same bust. It is therefore supposed, and with high probability, that there must have been far more in A. than mere vehemence of satire. Even Plato, who was not likely to err on the side of admiration in such a case, calls him 'the very wise'; and Gorgias, the rhetorician, is reported to have said, when Plato sent forth his dialogues against the Sophists, 'Athens has given birth to a new A.' There must have been strong sense and a keen perception of truth in the man, to have won so universal and permanent a reputation. Still the line of Horace—who was a vigorous imitator of him in many respects—proves that 'rage' was considered 'the special faculty' of A.

> '*Archilochum proprio* rabies *armavit iambo.*'
> *Ars Poetica*, line 79.

> 'Rage hath armed Archilochus with his own Iambus.'

The word *iambus* was in use before the time of A., and was employed to denote a species of rude raillery, such as flashed out spontaneously under the inspiring excitement of the Bacchic and other festivals. A. was, however, the first to reduce these irregular and capricious effusions to fixed rules. See IAMBICS. The semi-pentameter, of which he made abundant use, was called after him *Archilochian verse*.

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The fragments extant of his poetry have been edited by Bergk in his *Poetæ Lyrici Græcorum* (Leipsic, 1843).

ARCHIMANDRITE, n. *ăr'kĭ-măn'drīt* [L. and Gr. *archĭ-mandrĭ'tēs*—from Gr. *archos*, chief; *mandra*, a fold or enclosure as for cattle, a monastery]: title of the highest order of superiors of monasteries or convents in the Greek Church. See ABBOT. The Russian bishops are chosen from among the archimandrites.

ARCHIMEDEAN, a. *ăr'kĭ-mē'dē-ăn:* pertaining to *Archĭ-mēdēs*, a great mathematician of ancient times. ARCHIME'DEAN SCREW, a machine for raising water, consisting of a tube coiled spirally round a revolving axis.

ARCHIMEDES, *ăr-kĭ-mē'dez:* the most celebrated of ancient mathematicians; B.C. 287—212; b. Syracuse. He is said to have been a kinsman of King Hiero, though he does not seem to have held any public office, but devoted himself entirely to science. In regard to mathematics, we cannot estimate fully the merits of A. without a more exact knowledge of the state of the science as he found it; we know, however, that he enriched it with discoveries of the highest importance, on which modern mathematicians have founded their methods of measuring curved surfaces and solids. Euclid considers only a few curved figures in relation to one another, but without comparing them with rectilineal surfaces and solids. The theorems necessary to this transition are laid down by A. in his treatises 'on the Sphere and Cylinder,' 'on Spheroids and Conoids,' and 'on the Measurement of the Circle.' His demonstration that the area of a segment of a parabola is two thirds of the enclosing parallelogram, is the first real example of the quadrature (q.v.) of a curvilinear space. In his treatise on spirals, he rises to yet higher investigations, which, however, are not very easily understood even by masters of the subject.

A. is the only one of the ancients that contributed anything satisfactory on the theory of mechanics and on hydrostatics. He first established the truth that a body plunged in a fluid loses as much of its weight as is equal to the weight of an equal volume of the fluid. See ARCHIMEDES, THE PRINCIPLE OF. It was by this law that he determined how much alloy the goldsmith whom Hiero had commissioned to make a crown of pure gold had fraudulently mixed with the metal. The solution of the problem suggested itself to him as he was entering the bath, and he is reported to have been so overjoyed as to hasten home without waiting to dress, exclaiming: 'I have found it! I have found it!' (*Eureka! Eureka!*) Practical mechanism seems to have been an equally new science in the days of A.; for his boast, that if he had a fulcrum or stand-point he could move the world, betrays the enthusiasm with which the extraordinary effects of his newly invented machines inspired him. Among the numerous inventions ascribed to A. is that of the endless screw, and the *cochlea* or water-screw (see ARCHIMEDES SCREW), in which the water is made in a manner to ascend by its own gravity. During the siege of

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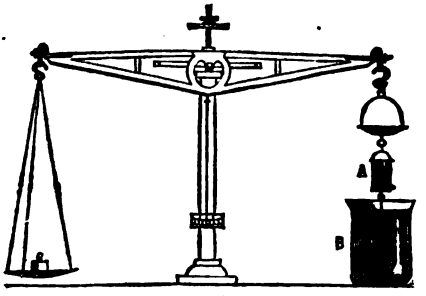
Syracuse by the Romans, he exerted all his ingenuity in the defense of the city. Polybius, Livy, and Plutarch speak with astonishment of the machines with which he opposed the attacks of the enemy. But while giving detailed accounts of his other contrivances, they say nothing of his having set fire to the ships by means of mirrors, a story which is not very probable in itself, and rests on later narratives. When the Romans took the city by surprise, A., according to tradition, was sitting in the public square lost in thought, with all sorts of geometrical figures before him drawn in the sand. As a Roman soldier rushed upon him, he called out to him not to spoil the circle. But the rude warrior cut him down. According to his own direction, a cylinder enclosing a sphere was engraved upon his tombstone, in commemoration of his discovery of the relation between these solids—a discovery on which he set particular value. When Cicero was in Sicily as quæstor (75 B.C.), he found the tomb hid among briers. His extant works have been edited by Torelli (Oxf. 1792), and Heiberg, with a Latin translation (Leip. 1881). There is a French translation by Peyrard (Paris, 1808), a German by Nizze (Strals. 1824). The *Arenarius* was translated into English by G. Anderson (Lond. 1784). Its object is to prove that it is possible to assign a number greater than that of the grains of sand that would fill the sphere of the fixed stars, the diameter of which A. assumes at a certain number of stadia. The difficulty lay in expressing such a vast number by means of the clumsy notation of Greek arithmetic, and the device by which the difficulty is eluded is considered as affording a striking instance of A.'s genius.

ARCHIMEDES, THE PRINCIPLE OF: one of the most important in the science of Hydrostatics, so called because the discovery of it is generally ascribed to the Syracusan philosopher. It may be thus stated: A body when immersed in



a fluid loses exactly as much of its weight as is equal to the weight of the fluid it displaces; or: A fluid sustains as much of the weight of a body immersed in it as is equal to the weight of the fluid displaced by it. It is proved experimentally in the following way. A delicate balance is so arranged that two brass cylinders, A and B, may be suspended from one of the scale-pans, the one under the other,

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The lower cylinder, B, is solid, or closed all round, and fits accurately into the upper cylinder, A, which is hollow. When the two cylinders are placed under one scale, pan-weights are placed upon the other until perfect equilibrium is obtained. The cylinder B is now immersed in water, and in consequence of the buoyant tendency of the water exerted upon it the equilibrium is destroyed; but it may be completely restored by filling the hollow cylinder A with water. The amount of weight which B has lost by being placed in the water is thus found to be exactly the same as the weight of a quantity of water equal to its own bulk, or, which is the same thing, to the quantity of water displaced by it. When bodies lighter than water are wholly immersed in it, they displace an amount of water of greater weight than their own, so that if left free to adjust themselves they swim on the surface, only as much of their bulk being submerged as will displace a quantity of water weighing the same as themselves. Accordingly, while bodies heavier than water displace, when put into it, their own bulk, bodies lighter than water displace, when allowed to float on the surface, their own weight of the fluid. Bodies of the same weight as water, according to the principle of Archimedes, have no tendency to rise or sink in it, for the water displaced by them weighs precisely the same as they do. The pretty scientific toy called the Cartesian Diver is intended to illustrate this. Although the principle of Archimedes is generally established with reference to water, its application extends equally to bodies immersed in air or any other fluid.

ARCHIMEDES SCREW (called also the *spiral pump*): machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for draining and irrigating the land. Fig. 1 represents it in its simplest form.

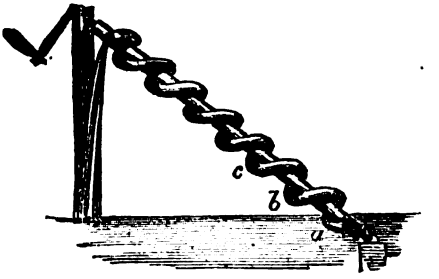

Fig. 1.

This consists of a flexible tube bent spirally round a solid cylinder, the ends of which are furnished with pivots, so as to admit of the whole turning round its axis. The machine is placed in an inclined position, so that the lower mouth of the tube may dip below the surface of the water to be raised. In the position represented in the figure, the lowest bend (*a*) of the tube will be filled with water, and if now

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the handle be made to turn in the direction of the hands of a watch, the mouth of the spiral tube will be raised above the surface; and the water inclosed in the tube, having no means of escape, will flow within it until, after one revolution, it will occupy the second bend, *b*. The first bend (*a*) has meanwhile received a second charge, which, after a second revolution flows up into the second bend (*b*), and takes the place of the first charge which has now moved up to the third bend, *c*. When, therefore, as many revolutions of the cylinder have been made as there are turns in the spiral tube, each of the lower bends will be filled with water; and in the course of another revolution, there being no higher bend for the water of the first charge to occupy, it will flow out of the tube by its upper mouth. At each succeeding revolution, the lowest bend will be charged, and the highest discharged. It will be seen from the figure that there is room to dispose a second tube side by side with the first, round the cylinder, in which case the screw would be called double-threaded. In the ordinary construction of these machines, the cylinder itself is hollowed out into a double or triple threaded screw, and inclosed in a water-tight case, which turns round with it, the space between the threads supplying the place of such tubes as are seen in Fig. 1. Fig. 2 represents a double-threaded A. S. of this description, with the case removed in front It is sometimes found convenient to fix the exterior envelope, and to

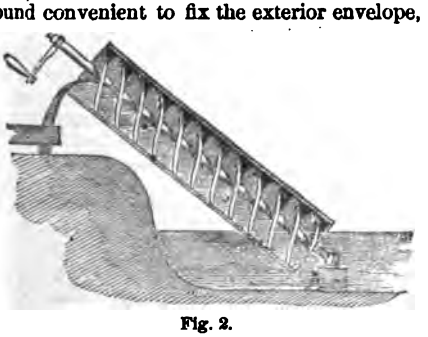

Fig. 2.

make the screw work within it, the outer edge of the latter being as close as possible to the former without actual contact. This modification of the A. S. receives the name of water-screw, and frequently of Dutch screw, from its being extensively used in Holland for draining low grounds.

ARCHIPELAGO, n. *ăr'kĭ-pĕl'ă-gō* [Gr. *archos*, chief; *pelăgos*, sea: It. *arcipelago*]: the Ægean Sea; any sea closely interspersed with islands—now frequently applied simply to a cluster of islands. ARCHIPELAGIC, a. *ăr'kĭ-pĕl-ăg'ĭk*, pertaining to an archipelago.

ARCHIPEL'AGO: a term applied originally to that gulf of the Mediterranean which separates Greece from Asia; but now extended to any sea, like it, thickly interspersed with islands, or rather to the group of islands themselves. The

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islands in the Greek Archipelago or Ægean Sea consist of two groups, called Cyclades and Sporades, the first from their being massed after the manner of a circle, the second from their being scattered in something of a line. The former lie to the e. of Southern Greece, while the latter skirt the w. of Asia Minor.

Of the Cyclades the principal islands are Lyra, Kythnos, Thera, Tenos, Andros, Naxos, Melos, and many more of inferior size. They all belong to *Greece* (q.v.). The chief islands of the Sporades are Scarpanto, Rhodes, Cos, Patmos, Nicaria, Samos, Scio, Metelin, Lemnos, Imbros, Samothraki, Thasos, and many more of inferior size. These all belong to Turkey, and constitute a separate vilayet of the empire. For the more considerable islands of both groups, and for the other Archipelagoes, loosely so called, see their respective titles.

It is noticeable that the islands of the globe rarely stand alone. With very few exceptions, they may all be classified into clusters. In most clusters, again, there is generally more or less of similitude between the different members of each—similitude sometimes of one kind, and sometimes of another. Perhaps the similitude most obvious even on the face of an ordinary map is that, really like the links of a chain, the members of a cluster have their lengths, as distinguished from their breadths, in one and the same direction. In the West Indies, for instance, look at the Bahamas, and look also at the Antilles, Greater and Lesser. In the East Indies, again, the same thing is seen in carrying the eye from the n. end of the Philippines to the n. end of Sumatra, or even on the Andamans. Lastly, on the opposite coasts of the Upper Pacific, observe the American side upwards from the s. end of Vancouver's Island to Mount St. Elias, and the Asiatic side downwards from the upper extremity of Kamtchatka—which is almost an island—through the Kuriles, to the lower extremity of Japan.

ARCHITECT, n. *âr'kĭ-tĕkt* [F. *architecte*—from L. *architec'tus*—from Gr. *architec'tōn*, a chief builder—from Gr. *archos*, chief; *tektōn*, a builder]: one who designs and plans buildings; a former or maker. ARCHITECTIVE, a. *âr'kĭ-tĕk-tĭv*, used in, or proper for, building. AR'CHITECTON'IC, a. *-tĕk-tŏn'ĭk*, that has the power or skill to build. AR'CHITECTON'ICS, n. *-ĭks*, the science of architecture. ARCHITECTURAL, a. *âr'kĭ-tĕk'tū-răl*, pertaining to the art of designing buildings. ARCHITECTURE, n. *âr'kĭ-tĕk'tūr*, the art of planning and constructing houses or ships; the appearance of them when built or framed.

ARCHITECTURAL PAINTING: painting having for its subjects the exteriors or interiors of remarkable buildings; churches, castles, streets in cities, etc. It is mentioned by Vitruvius, but is comparatively a modern art. Benozzo Gozzoli, Ghirlandajo, and the Venetian school, cultivated this department of art in the middle ages; and Pinturicchio, by order of Pope Innocent VIII., painted a series of views of cities in the style of the Flemish school, which, under the brothers Van Eyck, had distinguished itself by careful

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treatment of architectural backgrounds, etc. For a long time A. P. was regarded only as accessory to other styles of art; but at the close of the 18th c., P. Neefs, in his views of the interiors of Gothic churches, gave to this branch of the fine arts an independent form; and Steenwyck the younger, in the following century, extended its application in his views of the interiors of prisons, of which his picture of *Peter Liberated from Prison* is an example. The art was still further extended and cultivated by Van der Heijden, Blick, Van Deelen, E. de Ville, Johann Gehring, and others, who painted views of church interiors in the Italian style, palaces, and chambers. The interior view of the Church of Amsterdam, painted by Ruisdael, deserves especial notice. In the 18th c. the Venetian Canale and his nephew Bellotto (generally known by the name of Canaletto) painted many views of cities, but especially of the canals and buildings of Venice. Collections of their numerous works are found at Dresden, Woburn Abbey, etc.

In recent times, A. P. has been very successfully cultivated in Germany, France, England, Holland, and Belgium. Schinkel is celebrated for his fine union of classical taste with richness of decorative invention. His two most striking works are St. Peter's, and the Duomo at Milan; Paul Gropius has shown great talent in his Cathedral at Rheims, built in honor of Joan of Arc. His dioramas are well known; and Domenico Quaglio (d. 1837), throughout his innumerable compositions, has exhibited an exquisite appreciation of perspective and of the poetical arrangement of details. Among modern architectural painters may be mentioned—in England—Prout (views of Italy, Germany, etc); Roberts (whose genius has sought for its materials in Spain and the East, and who paints the architecture of foreign lands with rare truthfulness and vigor), Mackenzie, Goodall, Williams, and the water-color painters Haghe, Chase, Howse, and others; in France—Granet (d. 1849), the most celebrated art painter of the new French school; and the water-color painters Ouvrié, Garney, Rochebrune, and Villeret; in Italy—Migliara and Nehrlich (a German who has been styled 'the modern Canaletto'); in Germany—Von Bayer, Hasenpflug of Halberstadt (who paints beautifully old cloister-alleys under winter effects), Ainmuller, Vermeersch, Pulian of Düsseldorf (who displays great skill in the representation of old streets and time-worn churches), Conrad, Gärtner, Groeb, Helfft, Dietrich, etc.; in Holland and Belgium—Waldorp, Carsen, Boosborn, Von Haanen, Ten Kate, Springer, and Bossuet.

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AR'CHITECTURE: art of planning and constructing. A. is usually divided into Civil, Military, and Naval. In the present article the first is considered: for the other two see FORTIFICATION: SHIP-BUILDING. Civil A., in the widest sense, may be regarded either from an artistic, a scientific, or a utilitarian point of view. In the first case, as a means of giving external form and sensible expression to mental conceptions or ideas, it is a branch of æsthetics, or of the fine arts properly so called (see ART), and takes rank with sculpture and painting; in the second case, it consists in a knowledge of certain laws of physical nature, and a consequent power of calling them into play, or counteracting their operation, and is consequently a branch of that wider department of science to which the name of *Mechanics* (q.v.) is given; whereas in the last it becomes a practical art, which has for its object the application of the principles, both artistic and scientific, which A. embraces, to the elevation of national and individual character, and the increase of the physical comfort and well-being of mankind. But though it admits of being thus analyzed or separated in thought, it must not be imagined that A. can exhibit in practice any one of these principles to the exclusion of the others. The abstract conception of all-pervading deity, as embodied in the Greek temple—the religious aspirations after a personal God, as shadowed forth in the Gothic cathedral—can be realized only in accordance with the principles of mechanics, and the most rigorous adaptation of means to ends; whereas, in an opposite direction, the kraal of the Hottentot, the hut of the Indian in the American wilderness, or even the vulgar chimney-stack in the dingy manufacturing suburb, if properly constructed for their respective purposes, will be found to have obeyed such æsthetical principles as they may have come in contact with. Nature is not self-contradictory; and art and science, beauty and utility, when rightly understood, are never in conflict. A celebrated German writer and thinker (F. Schlegel) has described A. as 'frozen music:' and the comparison is just; for music, though apparently the freest and most lawless, is in reality the most rigorously scientific of the arts. But though a strict adherence to all the principles of A. be indispensable to every genuine architectural structure, whatever be its object, it does not follow that equal prominence must be given to each of these principles on every occasion. If a building has for its primary object the expression and commemoration of such feelings as grief, gratitude, devotion, or the like, this object manifestly will be best attained by subordinating the scientific and utilitarian to the æsthetic principles of A.; and the reverse will be the case where mere convenience, and also, though in a lesser degree, where convenience, in combination with beauty or magnificence, is sought. It is in a great measure by the prominence which they have given to one or other of these principles, that different nations have displayed their diversities of character in their A. The speculative and poetical character of the Greeks was exhibited in their temples, while their preference of the state to the individual appeared in the fact that these structures were designed for the worship of

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the protecting divinity of the city by the citizen of the state, not for the worship of a personal God by the individual man. Among the Romans, terrestrial power and material aggrandizement were the exclusive national aspirations, and consequently their A. had their own honor and glory primarily in view. The basilicas, amphitheatres, and triumphal arches of the Romans were their own; but the temples which they raised in honor of their gods were little else than imperfect copies from the Greek, with scarcely any assignable national characteristics. Then in mediæval times, though, on the revival of spiritual tendencies, æsthetic principles again became prominent, they exhibit themselves under totally different forms; and the distinctions between heathen and Christian thought could scarcely be more distinctly stated in words than they are exhibited to the eye in the difference between a Greek temple and a Gothic cathedral. Even the relation which subsists between Christian and Mohammedan A. (Gothic A. and Arabian A., q.v.) indicates the fact that Mohammedanism was but a sort of bastard Christianity. Domestic life appeared in full purity and vigor only in modern times; and then only do the utilitarian principles of A. prevail over the æsthetic. But apart from the mental characteristics and tendencies of a people, many other circumstances modify their A. Of these, one of the most important is climate. Arrangements for the permanent and commodious residence of a family within doors could not be expected to attain much perfection among a race like the Greeks, whose life was spent in the open air; and the climate of Holland, as well as the genius of the people and the character of their occupations, has had much to do with the fact that Dutch A. has rarely risen above a town-house. Following thus the peculiarities of national character and circumstances, it is obvious that the more widely these differ in any two nations, the more dissimilar will be the styles of A. which they produce respectively. Moreover, it is apparent that the higher the stage of national development, the more marked will be the character which the A. of the people will assume. A. thus bears a strict analogy to language. Both are an expression of thought, and in the one and in the other the richness, variety, and precision of the expression will be in proportion to the quantity and quality of the thought to be expressed. Further, in the fact that all genuine A. is the expression of the ruling national ideas and forms of thought of some one particular people, we perceive the reason why a building compounded of several styles should be characterless and unpleasing; and why this should be more and more the case, the more characteristic the styles compounded, and the greater the equality preserved among them. The Doric pillar in itself, still more, perhaps, the Roman adaptation of it, is the simplest and most rudimentary of all pillars; and what we are in the habit of calling Saxon is the simplest and most rudimentary of all the styles of Gothic A.; and hence the introduction of a few Tuscan pillars considerably modified into a Saxon or Romanic church does not awaken feelings of very decided repugnance, whereas an attempt to combine equally the

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beauties of the Parthenon and of Cologne Cathedral in the same building would be revolting. For the origin and development of the different styles of A., see EGYPTIAN A.: INDIAN A.: GREEK A.: GOTHIC A.: ARABIAN A.: also ARCH: PILLAR: ARCHITRAVE: etc. The attempt may here be made to trace the earlier stages through which A. passed in the historical nations, before it reached the point at which it afforded the means of expressing the feelings or supplying the wants of mankind.

1. The earliest stage of monumental A. in every part of the world seems to have been that in which it supplied to the existing generation the means of setting a mark on the face of the earth, of a nature so ineffaceable it should continue visible to future generations. No attempt was yet made to tell a tale either by the form of the monument, or by any figure or inscription engraven on it. Apart from the tradition intended to accompany it, it was speechless—confessedly unintelligible. But it is easy to see how powerful would be the effect of such an erection in preserving that tradition from oblivion, and fixing it down to the particular locality; for so long as a conspicuous object existed, obviously the work of human hands, the cause of its existence would be a subject of curiosity, which could be gratified only by inquiries that must lead to a recital of the events intended to be commemorated. It was with this view that Joshua (xxiv. 26) took a stone, and set it up under an oak that was by the sanctuary of the Lord—'And said unto all the people: Behold, this stone shall be a witness against us; for it hath heard all the words of Jehovah which He spake unto us.' To this primary class of monuments belong those tumuli or barrows, and conical heaps of stones called cairns, carns, or kearns, which, when they occur in Britain, are perhaps rightly ascribed to the Celtic portion of the early inhabitants, but which there is much reason to believe have been erected by every race at a certain stage of their progress. The barrow, it is true, is not wholly destitute of architectural arrangements. Occasionally it contains a passage or narrow gallery leading to a square enclosure or small chamber, in which the remains of bones, and of rude urns, drinking-cups, and other articles, sometimes of Roman or Brito Roman manufacture, are found. The barrows are always, however, of the rudest and most inartificial construction, and in considering them we are only on the threshold of architectural science.

2. The earliest class of erections to which this title can with any propriety be given are those commonly spoken of as Druidical temples. These consist generally of separate stones, often of enormous size, raised on their ends, sometimes in a circle, and at other times so as to enclose an oblong space, which in some cases is rooted in by horizontal slabs. These roofing-stones are frequently of such prodigious weight as to give rise to many conjectures regarding the mechanical means by which, and the mechanical knowledge of those by whom, they were placed in the positions in which we see them. These strange, and, to us, almost wholly unintelligible remains of antiquity, when of great

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extent, assume an air of savage and gloomy majesty. Of this the most conspicuous instance anywhere to be found is that of Stonehenge (q.v.), in Salisbury Plain in Wiltshire. Wherever a Celtic population existed, these monuments are to be found. Drudical monuments are more common in France than in England; and in France, as might be expected, they exist in the greatest numbers and variety in Brittany (q.v.), though none of them approach the magnitude, or, in some respects, the workmanship of Stonehenge. The Celtic monument of Brittany are of different classes, and have received different names—that which is most architectural in character being the dolmen, or cromlech, as it is called in England. The cromlech consists generally of two rows of perpendicular stones, arranged so as to fit somewhat closely to each other, and covered with horizontal roofing-slabs, thus forming a chamber, generally of such height as to allow a man to walk through it upright. But the largest and most perfect specimen of the dolmen is to be seen, not in Brittany, but in the neighborhood of Saumur on the Loire. It measures more than 80 ft. in length. To the same early stage in the science, though probably to a much earlier period in point of time, are to be referred those cyclopean walls and fortifications which at Tiryns and Mycenæ in Argolis excited the wonder of the later Greeks; the Etruscan walls at Fiesole; and the similar structures found both in Central and S. America.

8. The next stage in advance of that primeval and prehistoric one of which the traces are thus so widely spread, is that at which the science seems to have culminated in all but the classical nations of antiquity, and those races which have had the benefit of their genius and invention. We have here an accurate measurement of parts, and a corresponding division of the building. The pillar also makes its appearance, though it is by no means used with the same freedom, nor does it exhibit the same variety of form to which it attained in Greek A. This stage was attained by the inhabitants of Central and S. Amer. before its discovery by Europeans; and in Mexico, even by the Toltecs, an earlier race, which had given way before the Mexicans of the days of Cortez. Peruvian A. exhibits neither columns nor arches; but the remains of the palace at Mitla possessed a portico with plain cylindrical columns; and the walk were covered with rude sculpture. In the cloisters of a building at Palenque, a species of inartificial triangular arch, formed by courses of stones projecting over each other, was found. It is very instructive as showing the natural, and, so to speak, necessary character of certain architectural forms at certain stages of national development, to find that the pyramid, which is little more than a regularly constructed cairn, is found even more frequently in Mexico than in Egypt; and whether or not it was the primary form of the pagoda of India, it certainly formed the basis both of Mexican and Egyptian A. The keen discussions as to the priority of date of Indian and Egyptian A. lose much of their importance when a race is found acting in all probability independently of both, starting from the same primary

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form as the one, and in the discovery of the pillar and the arch making two of the most important of the further steps in advance to which they respectively lay claim. Keeping these facts in view, it seems, moreover, that something more is required to prove a historical connection between Doric and Egyptian A. than the circumstance that the columns which they respectively employ possess a base, a shaft, and a capital, or that both are used to support an entablature. Even the long unbroken horizontal lines which seem to indicate an affinity between the architectural styles of Egypt and of Greece, and which distinguish them both so sharply from the Christian A. of mediæval Europe, may be the result rather of a similarity of circumstances than of an identity of origin. Though these styles agree in having columns, and though the columns support horizontal entablatures in each they disagree in the forms of the columns, in the character of the entablature, and, indeed, in almost every other particular. While Greek pillars taper towards the top, and the walls are vertical, in Egyptian buildings the reverse is the case, the pillars being vertical and the walls sloped. When the effect of a whole Greek building, surrounded by a colonnade, and of an Egyptian building is considered, a certain similarity appears—the base in each case being wider than the upper part; but the result is produced in the one case by sloping the pillars, and in the other by sloping the walls, the external edges of which form a slightly acute angle with the base of the building. The great distinction, however, between the A. of Egypt and Greece consists in the stages which they respectively reached. The A. of Egypt retained throughout a character of gloomy strength, and never attained the lightness, freedom, or variety of that of Greece. In one case, the traditionary forms continued throughout to dominate and subdue the free spirit of art; in the latter, art triumphed over tradition, and owned no laws but its own. It is at this point that the distinction appears between the stage of A. of which Egyptian may be considered the type, and that ultimate stage reached by the Greeks in one direction and by the various Germanic nations in another. See ARABIAN A.: BYZANTINE ART: GOTHIC A. For the profession of architecture, see BUILDING.

ARCHITRAVE, n. *ár'kĭ-trāv* [It. *architrave*—from Gr. *archos*, chief: It. *trave*, a beam of timber—from L. *trabem*, a beam]: in *arch.*, that part of the entablature which rests immediately upon the capitals; a molding above a door or a window, and the like.

ARCHIVES, n. plu. *ár'kīvz* [F. *archives*—from L. *archĭvum*, a depository for important documents—from Gr. *archeion*, the public hall]; the place where public documents are kept; a collection of records or documents. See RECORDS. ARCHIVAL, a. *ár-kī'vāl*, of or containing archives. ARCHIVIST, n. *ár-kī'vĭst*, a keeper of records.—SYN. of 'archives': records; chronicles; registers.

ARCHIVOLT, n. *ár'chĭ-vōlt* [It. *archivolto*—from *architrave*, and *volto*, a vault, an arched place]: in *arch.*, a band

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or group of moldings and ornaments on the face of a classical arch; a mass of moldings on the faces and soffits of mediæval arches.

ARCHON, n. *âr'kŏn* [Gr. a ruler, a prince]. the highest magistrate in ancient Athens. The government was originally monarchical; but on the death of Codrus (q.v.), the Athenians, according to the traditionary account, resolved that no one should succeed him with the title of king (*basileus*), and therefore appointed his son Medon with the title A. (ruler). The office was at first for life, and confined to the family of Medon; but B.C. 752, the time of office was limited to ten years; and in 714, the exclusive claims of Medon's family to the office of A. were abrogated, and it was thrown open to all persons of noble birth; afterwards to all citizens, without distinction of rank (B.C. 477). In 683, the office had been made annual, and the number of archons had been extended to nine. The year was named from the first A., to the second, styled Basileus, belonged the care of religious affairs; the third was Polemarchos, or commander-in-chief; and the remaining six, having to conduct all criminal trials, were styled Thesmothetæ, or lawgivers.—Among the Jews, during the time of their subjection to the Romans, the title of A. had various meanings; but was generally given to the members of the Sanhedrim or supreme council.—In the mystical jargon of the Gnostics, the term A. was frequently employed, and hence one of their sects, especially opposed to Judaism, received the name ARCHONTICS. See GNOSTICS.

ARCHYTAS, *âr·kī'tăs*, of Tarentum: one of the most illustrious men of antiquity; lived abt. B.C. 400. His father's name was Mnesagoras. A. is said to have been a contemporary of Plato, and on one occasion to have saved the life of the latter when the tyrant Dionysius wished to put him to death. His public career was glorious. He was seven times elected general of his city, though it was customary for the office to be held only for one year; and in every campaign which he undertook, he was victorious. His civil administration was equally fortunate. Affairs of the highest moment were repeatedly intrusted to him; and yet, though deeply skilled in philosophy and politics, he had a childlike simplicity of character. He was drowned on the Apulian coast. A.'s virtues were as conspicuous as his talents. He paid the most humane attention to the comfort and education of his slaves, and although one of the greatest geometricians, he did not disdain to make a rattle for the amusement of his children. He solved the problem of the doubling of the cube, and secured almost the reputation of a magician by his numerous mechanical contrivances, the most wonderful of which was the flying pigeon. A Pythagorean in philosophy, he is generally supposed to have exerted a considerable influence on Plato, and some affirm that even the gigantic understanding of Aristotle was indebted to him for the idea of his categories. Only fragments of his writings remain. They relate to metaphysics, ethics, logic, and physics.

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ARCIDOSSO, *ār-chē-dŏs'sō:* town of Central Italy, prov. of Grosseto, 23 m. n.e. from Grosseto, on a feeder of the Umbrone, among the Apennines. Pop. (1881) 1,937.

ARCIS-SUR-AUBE, *ar-sē'sür-ōb:* small town in the French department of Aube; lat. 48° 32′ n., long. 4° 8′ e.; remarkable for the battle, 1814, March 20–21, between Napoleon and the allied forces under Prince Schwartzenberg. The battle, beginning with several skirmishes on the first, and ending in a general engagement on the second day, when the French retreated over the Aube, was not in itself very important. But Napoleon now formed the plan of operating in the rear of the Allies, and left the road to Paris open; assuming that they would not venture to proceed without attempting first to secure their rear. The Allies marched, nevertheless, on the capital, and thus decided the campaign. Pop. abt. 3,000.

ARCOGRAPH, n. *ärk'ŏ-gräf* [L. *arcus*, a bow: Gr. *graphein*, to grave, to describe]: an instrument for describing an arc without the use of a central point; a cyclograph.

ARCOLA, *ār-kō'la*, or ARCO'LÉ: village on the left bank of the Adige, Northern Italy, 15 m. e.s.e. of Verona; famous for the victory gained by Bonaparte over the Austrians, 1796, Nov. 17. The Austrians, relieved by the retreat of Moreau from the Rhine, had begun to take the offensive in Italy, and General Alvinczy appeared at the head of 50,000 men, with the main body of which he advanced to Caldiero, and threatened Verona. Bonaparte, recognizing the danger, descended by night the course of the Adige, crossed that river at Ronco, and was thus in a position to threaten the left flank of Alvinczy's army, which was posted at A. A causeway leads from Ronco across the morasses to A., before reaching which the road crosses the small stream of the Alpon by a narrow bridge. This bridge was defended by the Austrian general Mittrowsky, with fourteen battalions of infantry, and two squadrons of cavalry. On the 14th of November, Augereau attacked the bridge with two battalions of grenadiers, but being exposed in flank to the Austrian fire was obliged to withdraw. Bonaparte now seized the standard himself, and rushed on the bridge, followed by the grenadiers; but again the fire of the Austrians, who were in much greater force than the French, made it necessary to draw back. The struggle was renewed on the 16th, with a similar result; and it was only on the 17th that the French succeeded in getting possession of A., not, however, by forcing the bridge, but by sending a column across the Alpon, lower down, and getting in rear of the Austrians. On this Alvinczy was obliged to retreat to Vicenza. It fared no better with the other column of the Austrians under Davidovich. In this series of battles the Austrians lost 18,000 men killed, and 6,000 prisoners. The French loss was 15,000.

ARÇON, *ār-sōn'*, JEAN CLAUDE D': 1733–1800; b. Pontarlier: a distinguished French engineer. He was originally intended for the priesthood, but on manifesting a decided preference for the study of Vauban, his father, an eminent

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jurisconsult, consented to his choice of a military profession. In 1754, he entered the Military School at Mézières, and in the following year he passed as an engineer. During the Seven Years' War, he acquired considerable reputation, especially in the defense of Cassel. His fertility of invention was surprising, and his writings show a rich and vigorous genius. He was even bold enough to question the wisdom of certain strategical propositions of the Great Frederick. But his most famous scheme was that by which he hoped to reduce Gibraltar, then in the hands of the English, and defended by Governor Elliot. He contrived floating batteries, incombustible, and not liable to sink, which, however, were not successful, though this is mainly to be attributed to the fact of his efforts being indifferently supported. When the French, under Dumouriez, overran Holland, A. took several strongly fortified places, among others Breda. After this, he retired from public life, and confined himself to the literature of his profession. His most important work is *Considérations Militaires et Politiques sur les Fortifications* (Paris, 1795). In 1799, Bonaparte called him to the senate, but he died the year after.

ARCOS DE LA FRONTERA, *är'kōs dā lā frŏn-tā'rā:* town on the right bank of the Guadalete, Andalusia, Spain. Its principal manufacture is that of tanned leather, which was the first established in Andalusia; thread and ropes are also made. A. has a wild and romantic situation, which harmonizes well with the picturesque garb of the inhabitants, who still wear the old national costume. It was called Arcos, from being built in the form of a 'bow'; and after Alfonso-el-Sabio had rescued it from the Moors, it received the additional name of *de la Frontera*, from its frontier position, being in the vicinity of the Moorish kingdom of Granada. Almost impregnable by nature, it was further more embattled with walls and towers, part of which still remain, and afford a magnificent view of the Ronda Mountains. The rich plains that lie below the rocky town are famed in the Spanish ballads for their breed of war-steeds, 'Arcos barbs.' Pop. (1894) 16,280.

ARCOT, *är-kŏt'* properly ARKÁT: city of Hindustan, in the presidency of Madras, cap. of the dist. of n. Arcot; on the right bank of the Palar, a river which, rising in Mysore, is, in the rainy season, about half a mile wide before the town. It is in n. lat. 12° 54', and in e. long. 79° 24'; 65 m. from Madras. Besides the military cantonment, which can accommodate three regiments of cavalry, A. contains some mosques in a passable state of repair, and the ruins of the Nawaab's palace. A. is noticeable chiefly for its history. It was the spot where Clive first firmly established his military reputation. With a force of 300 Sepoys, 200 Europeans, and three field-pieces, he marched against A., which was garrisoned by 1,100 men; and after having taken it, he stood a siege of fifty days against thousands of assailants, amid hardships and privations of every description. Pop. 11,000, one-fourth Mohammedans.

ARCOT: a portion of the presidency of Madras. It con-

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sists of two districts, the northern and the southern, of which the respective areas are 7,256 sq. m. and 4,873. and the respective populations (according to the census of 1891) 2,180,487 and 2,162,851.

As most of the rivers are destitute of water in the dry season, there are thousands of tanks in A. Some of them are of an enormous size; that of Cavery-pak, in particular, measures eight m. by three. These tanks are indispensable, as well for irrigation as for domestic use. The hot and parching winds from the west, sweeping down the valleys of the Eastern Ghaats, are often fatal to birds on the wing, and also to human beings when exposed for any length of time. Glass cracks and flies in pieces, and wood shrinks, splits, and shivers; and from the mutual friction of the sapless trees spontaneous combustion sometimes takes place in the jungles.

ARCTIC, a. *ärk'tik* [L. *arcticus:* Gr. *arktikos*, near the bear, northern—from Gr. *arktos*, a bear, a cluster of stars in the north heavens called the Bear: F. *arctique*, northern]: pertaining to the north; northern; very cold. ARCTIC REGIONS, the lands surrounding the north pole. ARCTIC CIRCLE, an imaginary line passing round the north pole at a distance from it equal to the obliquity of the ecliptic, or 23½°. The corresponding circle round the south pole is the *Antarctic* circle. Within each of these circles there is a period of the year when the sun does not set, and another when he is never seen, this period being longer the nearer to the pole. ARCTIC CURRENT, an ocean-current which originates in the n. polar regions, and flows southward to the equator. ARCTIC SEA, the sea lying around the n. pole.

ARCTIC HIGHLANDS: name sometimes applied, not very appropriately, to that portion of the American continent between Hudson's Bay and the mouth of the Mackenzie. It has been the scene of all, or nearly all, the overland efforts in connection with the exploration of a Northwest Passage. from Hearne's discovery of the Coppermine down to the recent voyage of Anderson—the most prominent among the intermediate laborers having been Franklin, Richardson, Back, Dease, Simpson, and Rae.

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ARCTIC OCEAN: that part of the universal sea which surrounds the north pole. Its single boundary, that towards the south, naturally divides itself into four sections—the n. shores respectively of the two continents, and the n. limits respectively of the two intercontinental oceans.

The A. O. meets the Pacific at Behring Strait, about 66° of n. lat., so that here the A. O. overlaps the Arctic circle by about 30′. On the side of the Atlantic the common border seems equally independent of arbitrary definition, for Scoresby Sound almost as definitely terminates the s. e. coast of Greenland as North Cape terminates the n. w. coast of Europe; so that, as both extremes are intersected by about the same parallel of 71°, the A. O. here falls short of the Arctic circle by about 4½°.

In the old world, the A. O., if we include its gulfs, stretches s. of the Arctic circle, in the White Sea, fully 2°; while at Cape Severo, the most northerly point of Asia, lat. 78° 25′ n., it falls short of the same by 11° 55′. Lastly, within the range of the new world, the A. O., in its strict acceptation, is everywhere forced back within the Arctic circle, about 5° at Point Barrow, about 7½° on Barrow's Strait, and about 3° at the Strait of the Fury and Hecla.

The waters of the A. O., however, may conveniently be considered to extend beyond these their strict limits. So far as the mere aspect of the map is concerned, Davis's Strait, Baffin's Bay and Hudson's Bay may be regarded as gulfs rather of the Atlantic than of the A. O. But if essential characteristics are permitted to outweigh mere position, they must be assigned rather to the A. O. than to the Atlantic. Besides being all fed by currents from the A. O., they are all hyperborean in temperature. Even the most southerly of the three illustrates this. While Hudson's Straits present, in general, more ice than Davis's Strait or Baffin's Bay, Hudson's Bay itself has been the scene of perhaps the two most abortive, if not most disastrous, of all modern attempts at northern discovery. On opposite sides of Southampton Island, Lyons and Back were arrested by impenetrable packs, the one near the Bay of God's Mercy, and the other off Cape Comfort—the latter point being 1½°, and the former being twice as much, s. of the Arctic circle. Reckoning, therefore, to the bottom of James's Bay, as an arm of Hudson's, the arctic seas, thus appended to the A. O. proper, reach as far s. as the parallel of London.

Little as is yet known, at least accurately, of the A. O., its discovery and exploration have developed and tasked more skill and heroism than perhaps the exploration and discovery of all the rest of the world since the age of Columbus. Without anticipating what is to be said on this subject under the titles of NORTHEAST PASSAGE, NORTHWEST PASSAGE, and POLAR EXPEDITIONS, here may be stated summarily the comparatively easy labors of the Russians while issuing, as it were, from their domestic rivers to survey their domestic shores. About a century and a quarter ago, the Muscovites simultaneously sent forth five expeditions to complete, if possible, the Northeast Passage. From the White Sea to the Obi, four seasons were consumed; from the Obi

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to the Yenisei, four seasons; from the Yenisei to the Lena, season after season was spent in both directions without success; from the Lena to the Kolyma, six seasons were occupied; from the Kolyma to the Pacific every effort was fruitless, though the Cossack Deshneff was known to have accomplished this part of the enterprise about a century before.

Arctic navigation is beset by almost every imaginable difficulty and danger. In addition to the peculiar perils of ice in all possible states, the adventurer, often blinded by fogs and snows, has to face, generally without guide or sea-room, the storms, tides, and currents of comparatively unknown waters. If such be his three months of summer, what must be his nine months of winter! On the parallel of 73°, and under a temperature of 15° below zero Fahr., Capt. McClure spent the night of 1851, Oct. 30, on the ice, amid prowling bears, and that without food or ammunition—his only guide being a pocket-compass, useless in the dark.

A combined series of expeditions were sent forth in 1882 by the various European countries and the United States, to spend the winter in a high latitude and make careful observations in terrestrial magnetism and meteorology, as well as in geography and other branches of science. Nine stations were equipped so as to form a kind of ring round the north pole, and during the winter 1882–83, valuable observations were recorded at the stations in Jan-Mayen, Lapland, Spitzbergen, Nova Zembla, Sagastyr Island (mouth of Lena), Point Barrow, Great Slave Lake, Lady Franklin Bay, and Cumberland Sound.

Notwithstanding the labors and researches of two centuries and a half, very little of this vast ocean has been even seen by man. To the n. of 83° 30′, in fact, the A.O., so far as authentic evidence goes, is a mere blank to geographers; for Parry, 1827, barely reached lat. 82° 45′; Kane, in 1854, touched only 81° 22; the *Polaris*, in 1871, reached only 82° 16′; in 1874, the Austro-Hungarian Polar Expedition just reached 82° 5′; and the British Expedition of 1875–76 could advance no further than 83° 20′, the highest latitude ever attained. At all the intermediate points of longitude, the northern limit of geographical knowledge falls short, more or less at every point, of the parallel of 83°. Perhaps the actual average of such northern limit, even on the full tale of 360° of long., may not exceed lat. 75°, so as to leave absolutely unknown a circle of 30° of lat., or nearly 2,100 m. in diameter—an area little inferior to that of Europe. This untrodden world, however, is not to be regarded as a continuous wilderness of ice. Parry, at his furthest point, found not an unbroken field, but separate floes, with more or less of open water between them—the mildness of the temperature being indicated by falls of rain; and Kane, again, at his furthest point, saw a free sea to the north, as far as the eye could reach, from a promontory 240 ft. high; while, to use his own words, 'a gale from the n.e., of 54 hours in duration, brought a heavy swell from that quarter without disclosing any drift or other ice.' This is quite in keeping with the fact already noticed, that Hudson's Straits and Bay are often more en-

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cumbered with pack than the waters of far higher latitudes. With regard to currents, Parry, during nearly the whole of his boat-sleigh expedition of 1827, found that his place by reckoning was considerably ahead of his place by observation, or, in other words, that his northward progress on the floes was neutralized more or less by the southward progress of the floes themselves, the existence of a current towards the south being thus shown. McClure derived advantage from the current whether advancing through open water or drifting along at the mercy of the pack. The experience of Weyprecht and Payer was different from that of any preceding navigators, since they found that they steadily drifted *north*. While McClure had the fortune to return with the news of the discovery of the Northwest Passage, McClintock has shown that the discovery must have been anticipated by Sir John Franklin. Succeeding expeditions, of which a great number have been equipped by England, Germany, France, Sweden, the United States, Austria, and Denmark, have been directed mainly towards the north pole. The reports of the expedition of 1875–76 led to the conclusion that the pole is surrounded by an inaccessible region of ice, to which has been given the name of the Palæocrystic Sea, or Sea of Ancient Ice. The Northeast Passage was accomplished for the first time by Professor Nordenskiöld in 1878–79; and repeated successful voyages have been made with cargoes between Western Europe and the mouths of the Obi and Yenisei, by way of the Kara Sea.

The only section of the southern A. O. that is moderately well known to a a distance from the continent is that which washes the n.e. of America. It contains, under the collective name of Polar archipelago, many large islands. Off the coast of the old world are Spitzbergen, Nova Zembla, New Siberia, Wrangel Land, King Charles Land, etc. The latest discovery, made by Weyprecht and Payer, 1873, is that of Franz Joseph Land, an extensive and mountainous tract, lying about 200 m. due n. of Nova Zembla. Its s. coast is in about 80°n. lat., and it was seen to extend as far n. as 83°, occupying at least 15 degrees of longitude. The chief straits are Lancaster Sound, Barrow's Strait, Smith's Sound, Strait of the Fury and Hecla, Wellington Channel, Banks Strait, etc. The chief rivers, all of them on the mainland, are the Obi, the Yenisei, and the Lena, of the first class; the Mackenzie, the Yana, the Indigirka, and the Kolyma, of the second; and many others of the third.

The principal commercial production of the A. O. has been the whale. The whale fisheries on the w. of Spitzbergen, and on both sides of Greenland, scarcely need be mentioned. But it may not be generally known that, according to official returns quoted by Admiral Beechey, the Americans had in two years drawn more than $8,000-000 from the whale-fishery at Behring Strait alone.

On the side of East Siberia, however, the A. O. produces a more remarkable article of traffic. Here are found, in the greatest abundance, the bones of the mammoth. Spring after spring, the alluvial banks of the lakes and rivers, crumbling under the thaw, give up, as it were, their dead:

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while the islands lying off the Yana teem with these memorials of antiquity. (See Nordenskiöld's *Voyage of the Vega*, 1882.)

The American half of the A. O., if it cannot boast of fossil ivory, presents something still more difficult to be explained. In lat. 74° 25′, and lat. 76° 15′ respectively, Captain McClure and Lieutenant Mecham discovered large deposits of trees, apparently indigenous, of considerable size. Writing of Banks' Island, McClure has the following passages: 'From the summit of these hills, which are 300 ft. high, to their base, abundance of wood is to be found, and in many places layers of trees are visible, some protruding 12 or 14 ft., and so firm that several people may jump on them without their breaking; the largest trunk yet found measured 1 ft. 7 in. in diameter'—equivalent in girth to about 5 ft. Again, 'I entered a ravine some miles inland, and found the n. side of it, for a depth of 40 ft., composed of one mass of wood. Some of it was petrified, the remainder very rotten, and worthless even for burning.' Writing of Prince Patrick Island, Mecham has the following passage: 'Discovered buried in the e. bank of the ravine, and protruding about 8 ft., a tree of considerable size. During the afternoon I found several others of a similar kind; circumference of first and second tree seen, 3 ft.; of another, 2 ft. 10 in. From the perfect state of the bark, and the distance of the trees from the sea, there can be but little doubt that they grew originally in this country.'

ARCTOGALIDÆ, *ärk-tō-găl'ĭ-dē* [Gr. *arktos*, a bear; *galē*, a weasel]: family of carnivorous Mammalia, containing the skunks (*Mephites*) and some allied animals.

ARCTOMYS, *ärk'tō-mĭs* [Gr. *arktos*, a bear: L. *mus*, a mouse]: the Mammalian genus to which the Marmots belong. It is placed under the *Rodentia*. They have pointed cheek-teeth. There are several species, the *A. marmotta*, or Marmot, living in the mountains of Europe and Asia, the *A. bobac* of Poland and n. Russia, the *M. citillus*, the Zizel or Souslik, and several from America. See MARMOT. *A. monax* is the common woodchuck.

ARC'TUM: see BURDOCK.

ARCTURUS, n. *ärk-tū'rŭs* [Gr. *arktos*, a bear; *oura*, a tail]: a fixed star of the first magnitude, in the constellation Boötis, which is situated behind the tail of the Great Bear.

ARCUATION, n. *är'kū-ā'shŭn* [L. *arcus*, a bow]: the act of bending; crookedness; in *gardening*, the method of propagating certain trees by bending down to the ground the branches which spring from the offsets or shoots after they have been planted. ARCUATE, a. *är'kū-āt*, bent in the form of a bow.

ARCUS SENILIS, *ärk'ŭs sĕn-ī'lĭs:* a not very well chosen term for change occuring in the cornea of the eye, in consequence of fatty degeneration of its marginal part. The term is objectionable, because the change usually

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commences before the advent of old age, and, further, because the *arcus*, or arch, is usually converted into a complete circle by the time that the patient has reached the age of sixty or seventy years. The *arcus senilis* usually commences at or even before the age of forty years, as an opaque whitish crescent, skirting either the upper or lower margin of the cornea; and from this commencement it extends along the edge, till it finally becomes a complete circle, which sometimes assumes a chalky whiteness, and gives to the eye a very peculiar appearance. On careful examination, it may be seen that a narrow interval of partially clear cornea always intervenes between the arcus and the opaque sclerotic. As far as the eye is concerned, the formation of this circle is of little importance, but it is of great diagnostic value to the physician if, as Mr. Canton and several late observers maintain, its presence indicates the co-existence of fatty degeneration of the heart.

ARD, *ârd*, or AIRD: a Celtic root, meaning 'height' (cf. Lat. *arduus*. high), which appears in many geographical names, especially in Ireland and Scotland.

ARDAHAN, *ar-dâ-hân'*: village of about 300 houses in the portion of Turkish Armenia ceded in 1878 to Russia; 35 m. n.w. of Kars. Its position gives it strategic importance. Its fortress was dismantled by the Russians in the war of 1854–56; in 1878, the Berlin Congress sanctioned the cession to Russia of A., which had been captured early in the war. On account of the severity of the climate, the houses of A. are mainly underground constructions.

ARDASSINE, n. *âr-dăs'sĭn* [Fr. *ardassine:* Ar. and Per. *ardan*, a kind of raw silk]: the finest kind of Persian silk used in the French looms.

ARD'EA: see HERON.

ARDEB, n. *âr'dĕb* [Ar. *irdab* or *urdab*]: measure of grain containing almost eight bushels, used in the parts of Africa where the Arabs most abound.

ARDECHE, *âr-dāsh'*: dept. in the s. of France, taking its name from the river A., a tributary of the Rhone; includes the most northern part of ancient Languedoc. Greatest length from n. to s., 74 m.; greatest breadth, 44; 2,130 sq. m. A. is almost wholly mountainous. In the n.w. of the dept., the Cevennes culminate in the volcanic Mont-Mezène, 5,972 ft. in height. The variety of the numerous extinct volcanic peaks, deep craters, rugged valleys, masses of tufa, grottoes, rock-labyrinths, ranges of basaltic columns, gigantic dams, etc., give an extraordinarily picturesque scenery. The upland, which has winter for six or eight months, is devoted to pasturage; but the terraces and valleys near the Rhone have a warm climate, and produce good wine (white and red), olives, figs, almonds, chestnuts, etc. There are manufactures of silk, paper, leather, iron, etc., and good roads, with water-carriage, facilitate commerce. Lead, iron, copper, manganese, etc., are wrought. The chief towns are Privas, Aubenas, Bourg, St. Andéol. Pop (1881) 376,867; (1886) 375,492; (1891) 371,269.

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ARDEE': town in the w. of Louth county, Ireland, on the river Dee, 12 m. inland. It contains two ancient castles—one built about 1200, now used as the town-house; the other a square building, now used as a prison. The chief trade is in corn and other agricultural products. Pop. (1894) 2,972.

ARDEIDÆ, *ár-dē'ĭ-dē:* family of grallatorial or wading birds. They have large, long, and strong beaks and powerful wings, yet their flight is slow. They are migratory, frequenting the margins of lakes in various countries, or of the ocean, and are known as herons, bitterns, etc.

ARDENCY, n. *ár'dĕn-sĭ* [L. *ardens* or *arden'tem*, burning: OF. *ardant*, burning]: a state of burning; warmth of passion; zeal; eagerness. ARDENT, a. burning; eager; zealous. ARDENTLY, ad. *-lĭ.* ARDOR, n. *ár'dĕr* [F. *ardeur* —from L. *ardor*, burning]: heat; warmth; fervency; affection. ARDENT SPIRITS, distilled spirits—so named from their hot, burning qualities.

ARDENNES, *ár-dĕn':* the w. division of the slate-plateau of the Lower Rhine. It extends over portions of Belgium, France, and Rhenish Prussia, and consists of a broken mass of hills, for the most part of no great elevation, which gradually slope towards the plains of Flanders. In early times, the name was given to the whole of the region lying between the Rhine and the Sambre, a length of about 160 m. The average height of the hills is less than 2,000 ft.; but in the e. Mont St. Hubert attains an elevation of 2,300 ft. Large tracts of this region consist not of hills, but of gently undulating plateaus densely covered with oak and beech forests, while other portions are marshy, heathy, and barren. The districts through which the Meuse and other rivers flow present some extraordinary appearances. The channel of the river is sometimes bound in by rugged and precipitous cliffs more than 600 ft. high. The principal rocks of the A. are clay-slate, grauwacke, quartz, etc., interspersed with extensive strata of primitive limestone. Coal and iron mines are wrought in the n.w.; lead, antimony, and manganese also are found. There is little cultivation of grain, but multitudes of cattle and sheep are reared.

ARDENNES: a frontier dept. in the n. of France, bordering upon the provs. of Namur and Luxembourg in Belgium. It formed a part of the old prov. of Champagne. Length, from n. to s., 63 m.; breadth, from e. to w., 60; area, 2,020 sq. m. The n.e. of A. belongs to the basin of the Meuse; the s.w. is watered by the Aisne; both of these rivers are enriched with affluents, and united by the *Canal of A.* About one eighth of the whole surface is hilly, and covered with forests and wide tracts of pasturage. In the n. extremity of the dept., near Givet, marble is obtained; but the prevailing rock is limestone, veined with lead and iron. South of this, and stretching across the dept. from e. to w., are great layers of slate, with here and there flint, quartz, etc. In the s.e., muschelkalk, rich in iron-ore, abounds; and in the s.w., the soil is composed of arid chalk,

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a naked, treeless, elevated plain. Only the valleys are fertile, and produce corn. The vine is cultivated only at Mézières, in the southwest. Slate, marble, and iron, and porcelain-clay and sand for making glass are obtained. Excellent work-horses and sheep are reared. There are manufactures of earthenware, glass, marble, woolen cloths, metallic wares, etc. The principal towns are Mézières, Rethel, Rocroy, Vouziers, and Sedan, where Napoleon III. surrendered to the Prussians, 1870, Sept. 2. Pop. (1891) 324,923.

ARDNAMURCHAN POINT, *ärd-nă-mĕr'kăn:* the n.w. promontory of Argyleshire, and the extreme w. point of the mainland of Britain. A light-house was erected here in 1849, visible at a distance of 20 miles. For 10 m. around, the country consists of trap, resting on sandstone often hardened, and blue slates. The trap veins form many striking reticulations in the strata. South of the point are found numerous oolitic and lias fossils.

ARDOCH, *ar'dok:* small village in Scotland, county of Perth, 8 m. s.s.w. of Crieff, celebrated for a Roman camp, the nearest entire now in Britain. The camp is 2½ m. n. of the Greenloaning station of the Caledonian railway, in the grounds of A. House. The intrenched works form a rectangle, 500 by 430 ft., the four sides facing the cardinal points. The n. and e. sides are protected by five ditches and six ramparts, these works being 270 ft. broad on the n. side, and 180 on the east. A deep morass is on the s.e., and the perpendicular banks of the Knaig Water, rising 50 ft. high, protect the camp on the west. The prætorium, or general's quarter, now called Chapel Hill, rises above the level of the camp, but is not exactly in the centre, and is nearly a sq. of 60 ft. each side. Three of the four gates usual in Roman camps are still seen. A subterranean passage is said to have formerly extended from the prætorium under the bed of the Knaig. Not far n. of this station, on the way to Crieff, may be traced three temporary Roman camps of different sizes. Portions of the ramparts of these camps still exist. A mile w. of A., an immense cairn of stones lately existed, 182 ft. long, 45 ft. broad at the base, and 30 ft. in sloping height. A human skeleton, 7 ft. long, in a stone coffin, was found in it.

ARDOYE, *är-dwä':* t. of Belgium, prov. of W. Flanders, 17 m. s. from Bruges. Pop. 6,500.

ARDROSSAN, *är-drŏs'săn:* small seaport and summer bathing-place in Ayrshire. Its harbor, sheltered by an island, is one of the safest and most accessible on the w. coast of Scotland, and has been greatly improved, at vast expense, by the earls of Eglintoun. There is a large export of coal from this place, and ship-building is carried on. On a hill above the town stand the ruins of A. Castle, said to have been surprised by Wallace when held by the forces of Edward I. Wallace destroyed the garrison, and threw the dead bodies into a dungeon called 'Wallace's Larder.' Pop. (1894) 5,209.

ARDUOUS, a. *är'dū-ŭs* [L. *ar'duus*, steep, inaccessible]:

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of difficult attainment; attended with great labor. AR'DUOUSLY, ad. *-ŭs-lĭ.* ARDUOUSNESS, n. *ăr'dū-ŭs-nĕs.*

ARE, v. *ăr* [Dan. *ere:* Sw. *ære:* Icel. *eru*, are: Sw. *vara:* Dan. *vaere*, to be, to exist]: part of the verb *be.* ARE NOT, do not exist.

ARE, n. *air* [L. *ārĕă*, an open place]: the unit of the French land-measure, a square, the side of which is 10 metres (or 32,809 ft.) long (see METRE), and which, therefore, contains 100 sq. metres = 1,076 English sq. ft. The next denomination in the ascending scale is the *decare*, containing 10 ares; but the denomination commonly used in describing a quantity of land is the *hectare* of 100 ares, = 2·47 English statute or imperial acres.

AREA, n; *ā'rē-ă* [L.]: any inclosed or open space; an open space in front of or around a sunk flat or floor of a building. As a term of *math.*, it means *quantity of surface.* The calculation of areas, or mensuration of surfaces, is one of the ultimate objects of geometry. The measuring unit is a square inch, a square foot, etc., according to the unit of length. As a figure is thus measured by finding an equivalent for its surface in *squares*, the process is sometimes called the *quadrature* of the figure.

AREAD, AREED, or AREDE, v. *ă-rēd'* [AS. *arœd*, counsel; *arœdian*, to read; *rœden*, to interpret, to read: Goth. *redan*, to counsel, to provide]: in *OE.*, to advise; to declare; to show; to read.

ARECA, n. *ă-rē'kă:* a genus of palms containing several species, having pinnate leaves and double spathes. The fruit is a fibrous one seeded drupe, a nut with an outer fibrous husk. *A. Catechu*, the PINANG PALM, or Betel-nut Palm, is a native of the East Indies, whose nut yields a sort of catechu. See CATECHU. This Areca-nut or Betel-nut is very much used in all parts of the East, the chewing of it with quick-lime and the leaf of the betel-pepper being one of the most prevalent habits of the people. See BETEL. The nut is about the size of a hen's egg; the fibrous husk about half an inch thick. It is austere and astringent. It is doubtful if it possesses a narcotic power, or if this is to be ascribed entirely to the leaf which is used with it. Areca-nuts are a considerable article of trade in the East. The timber of the palm which produces them, and its leaf-stalks and spathes are also used for domestic purposes. The tree is often 40 or 50 ft. high, and in general less than a foot in diameter. The leaves are few, but very large, their leaflets more than a yard long. In Malabar, an inebriating lozenge is prepared from the sap.—*A. oleracea*, the CABBAGE PALM of the West Indies, is a very tall tree, 100–200 ft., whose huge terminal leaf-bud is sweet and nutritious, and is sometimes used for the table as cabbage, but when it is cut off the tree is destroyed. The stem of this tree, notwithstanding its great height, is remarkably slender. The nuts are produced in great numbers; they are about the size of a filbert, and have a sweet kernel.—*A. sapida*, the New Zealand Palm, is remarkable as extending southward beyond the geographical limits of any other of its order, as far indeed

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as lat. 38° 22′ s. It is a small palm, only from 6 to 10 ft. high, with leaves 4–6 ft. long. The young inflorescence is eaten.—*A. vestiaria*, a native of the East, is so called because clothing is made from its fibres.

ARECIBO, *ä-rā-sē′bō:* t. of Puerto Rico, Spanish West Indies, on the n. coast of the island. Pop. 10,000.

AREFACTION, n. *ăr′ă-făk′shŭn* [L. *arefac′ĕrĕ*, to make dry—from *arĕō*, I am dry; *facĭō*, I make]: the state of growing dry; the act of drying. AREFY, v. *ăr′ĕ-fī*, to dry.

ARENA, n. *ä-rē′nă* [L. *arēna*, sand]: a part of an amphitheatre (so called because it was usually strewed with sand, though when a fit of extravagance seized the Roman emperors they used borax and cinnabar instead), where the combats of gladiators and wild beasts took place. It had four main entrances, and was surrounded by a wall about 15 ft. high, so that the spectators were perfectly safe. The name was afterwards applied by the Romans to any building for exhibitions of baiting animals, horsemanship, etc. On the continent of Europe the name has been given to large summer theatres for dramatic performances in the open air. It is applied also, in a general sense, to any scene of contest or display of power.

ARENACEOUS, a. *ăr′-ĕ-nā′shŭs:* composed of grains or particles of sand; having the properties of sand.

ARENA′CEOUS ROCKS: rocks composed entirely, or to a large extent, of grains of silex. Beds of loose sand occur extensively in the more recent deposits. The grains, either of quartz or flint, are generally water-worn and rounded. In older deposits, the grains of sand are bound together by silicious, calcareous, argillaceous, or ferruginous cements. It is seldom that a rock is composed of quartzy materials alone; grains or particles of other mineral substances are frequently mingled with the grains of quartz. Silvery flakes of mica are seldom absent; and they often occur in layers parallel to the planes of stratification, causing the rock to split into thin slabs, and exposing a glittering surface. These are called *micaceous sandstones*. When grains of feldspar occur, it is a *feldspathic sandstone*. Often large quantities of calcareous matter, either as cement or as distinct grains, occur; and these are called *calcareous sandstones*. The presence of lime can always be detected by the effervescence which takes place on the application of muriatic or other acid. When the sandstone is coarse-grained, it is usually called *grit*. If the grains are large enough to be called pebbles, it becomes *conglomerate* or *puddingstone;* if the fragments are sharp and angular, it is called *breccia*.

ARENARIA, *ăr-ē-nā′rĭ-ă*, or SANDWORT: genus of plants of the natural order *Caryophylleæ*, differing from Stellaria (Stitchwort, q.v.) chiefly in the undivided petals. The species are numerous, annual and perennial herbaceous plants of humble growth, rarely somewhat shrubby, natives of the temperate and colder parts of the world. Some are arctic and alpine plants. Many are found chiefly in sandy

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soils. The flowers are generally small and inconspicuous, but, if closely examined, are seen to possess no little beauty.

ARENATION, n. *ăr-ē-nā'shŭn* [L. *arenatio*, from *arenare*, to sprinkle with sand]: in *med.*, a sand-bath; sprinkling hot sand upon the body

ARENDAL, *ä'rĕn-dăl'*: town on the s.e. coast of Norway, near the mouth of the Nid-elf in the bay of Christiania. It is built partly on piles, partly on rock, and this with its situation gives it a very romantic aspect. The bay, protected by the island of Tromöe, forms an excellent harbor, and favors the commerce of the town, which is considerable, in proportion to its size. A. is intersected by canals; its exports are iron from the neighboring mines, and wooden articles. Ship-building is carried on; and on a smaller scale, distilleries and tobacco-factories. King Louis Philippe, after the French Revolution, when wandering in the north as Duke of Orleans, made some stay here. Pop. 4,000.

ARENDALITE, n. *ä-rĕn'dăl-īt*. [In Ger., *arendalit*, from *Arendal*, near which it is found]: a mineral, a subvariety of ordinary Epidote. It generally occurs in dark-green crystals.

ARENDATOR, n. *ăr'en-dā'tor* [L. L.]: in Livonia and other provinces of Russia, one who farms the rents or revenues; one who contracts with the crown for the rents of the farms.

ARENG', or ARENGA. see GOMUTO PALM.

ARENI'COLA: see ANNELIDA.

ARENICOLITES, n. plu. *ăr'ē-nĭk'ŏ-līts* [L. *arēna*, sand; *colo*, I inhabit; Gr. *lithos*, a stone]: a term used to designate those circular holes or markings which appear on the upper surface of many sandstones, having apparently been worm-burrows.

ARENILITIC, a. *ä-rĕn'ĭ-lĭt'ĭk* [L. *arēna*, sand: Gr. *lithos*, a stone]: of or like sandstone. ARENOSE, a. *ăr'ē-nōs*, or ARENOUS, a. *ăr'ē-nŭs*, sandy. ARENARIOUS, a. *ăr'ē nā'rĭ-ŭs*, sandy; composed wholly or in large part of sand. ARENULOUS, a. *ä-rĕn'ū-lŭs*, full of sand; gritty.

AREOLA, n. *ä-r'ĕŏ-lä* [L. *ărĕŏla*, a small open space, a small garden-bed: F. *aréole*]: the colored circle round the nipple or a pustule. ARE'OLÆ, n. plu. *-lē*, small interstices of cellular or other tissues; little spaces on the area or surface. AREOLAR, a. *ä-rē'ŏ-lĕr*, of or like an areola. AREOLATE, a. *ä-rē'ŏ-lāt*, marked by areolæ, or little spaces or cavities. ARE'OLA'TION, n. *-shŭn*, any small space distinctly bounded by something different in color, texture, etc. AREOLAR TISSUE, the tissue that loosely connects skin with muscle, and also forms a soft connective packing between muscles, around blood-vessels etc., and is composed mainly of interlaced 'white fibrous' and 'yellow elastic' tissues.

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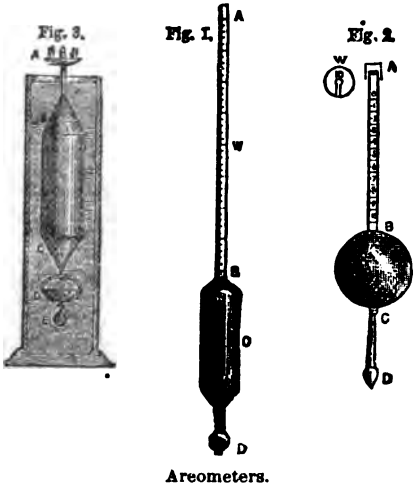
AREOMETER, n. *ār'ĕ-ŏm'ĕ-tĕr* [Gr. *araiós*, rare, thin; *métron*, a measure]: an instrument for measuring the specific gravity of liquids. AR'EOM'ETRY, n. *-trĭ*. AR'EOMET'RICAL, a. *-rĭ-kăl*, pertaining to.

AREOMETER [Fr. *aréomètre*, or *pèse-liqueur*: Ger. *Aräometer* or *Senkwage*], called also HYDROMETER: an instrument which is allowed to float freely in liquids, to determine their specific gravity or that of solid bodies. By specific gravity (q.v.) is meant the ratio that the weight of any volume of a substance bears to the weight of the same volume of water. Thus, a cubic foot of alcohol weighs 793 oz., while the same quantity of water weighs 1,000 oz.; the specific gravity of alcohol is set down, therefore, as $\frac{793}{1000}$ or ·793. A cubic foot of sulphuric acid weighs 1,841 oz., and has, consequently, a specific gravity of 1·841. These relations are not confined to the particular volume, one cubic foot, of these bodies, but hold for any equal volumes of them. Equal volumes of alcohol, water, and sulphuric acid have always to each other the ratio respectively of 793, 1,000, and 1,841; and this is only an instance of the general principle, that equal volumes of different substances have weights bearing to each other the direct ratio



Areometers.

of the specific gravities of these substances. This is the principle on which areometers with weights, or weight-areometers, are constructed. If, however, equal weights of any two of these liquids were taken, it would be found that ·793 of a cubic foot of water would weigh as much as 1·000 cu. ft. of alcohol; 1·000 cu. ft. of sulphuric acid as much as 1·841 cu. ft. of water; or ·793 cu. ft. of sulphuric acid as much as 1·841 cu. ft. of alcohol: more generally thus—when equal weights of two different fluids are taken, the

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volumes of each are inversely as their specific gravities. On this latter principle depends the use of areometers with scales, or scale-areometers. The scale-A. is employed much more commonly than the weight-A., and is, in consequence, a much more important instrument. Of the various forms of scale-areometers, that contrived by Gay-Lussac deserves particular notice, from the simplicity of the mode of graduation; and an account of it will give the best idea of the general nature of such instruments. See Fig. 1. It consists of a uniform glass tube, AB, blown into two bulbs, C and D, at the bottom. The lower bulb, D, is loaded with mercury, so that when the instrument floats in any liquid the stem, AB, is maintained in a vertical position. Suppose that the quantity of mercury is so adjusted that when placed in water the A. sinks to the point W, which may in consequence be called the water-point. According to the principle of Archimedes, the weight of the volume of water displaced by the instrument up to this point is equal to the weight of the instrument. Suppose, for the sake of simplicity, that the water so displaced is a cubic inch, the weight of the A. will be that of a cubic inch of water, or 250 grs. (more correctly 252·5 grs. at 60° F.). If the A. be now placed in a fluid heavier than water, such as a mixture of sulphuric acid and water having a specific gravity $\frac{5}{4}$ or 1·25, it is manifest that if it is sunk again to the water-point, the displaced fluid would weigh $\frac{5}{4}$ of 250 = 312½ grs., or 62½ grs. more than the weight of the instrument. As much, therefore, of the stem of the A. must rise above the liquid as will reduce the weight of the displaced liquid to 250 grs., or reduce the volume to $\frac{4}{5}$ of what it was before. If the stem in this case rises to B, the volume displaced by the part WB is $\frac{1}{5}$ of the volume displaced by the instrument at the water-point. If the whole be divided into 100 parts, and the mark 100 be at W, B must be marked 80, as the A. displaces up to that point $\frac{4}{5}$ of 100; and if the intervening space on the stem be divided into 20 equal parts, each of them will correspond with $\frac{1}{100}$ of the water volume—viz., ·01 of a cubic inch, or with $\frac{1}{100}$ of the weight of the instrument—viz., 2·5 grs. If the same scale be carried above the point W., and the divisions marked as ascending from 100, the A. will be serviceable likewise for fluids less dense than water, and will mark the volumes which it displaces in each of them. The A. thus graduated gives immediately the volumes which it displaces in different liquids; and from these, seeing that it displaces in every case a weight of liquid equal to its own, the specific gravities may be calculated according to the principle already stated—viz., that equal weights of two different fluids have volumes inversely as their specific gravities. If, in a mixture of sulphuric acid and water, the A. stands at 90, according to the above principle 90 volumes of the mixture weigh as much as 100 of water; therefore its specific gravity is $\frac{100}{90}$ or 1⅑. Again, if in a mixture of spirits and water it should stand at 110, 110 volumes of the mixture weigh as much as 100 of water, so that its specific gravity is $\frac{100}{110}$, or $\frac{10}{11}$. In all cases, then, 100 is to be divided by the number read on

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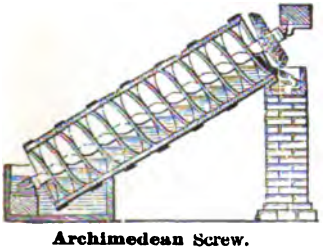
Roccella tinctoria, from which **Archil** is obtained.

Greek Archimandrite, from an original sketch.



Archimedean Screw.

Argali (*Caprovis Argali*).

Argali Sheep. Another specimen.

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the A., to determine the specific gravity of the liquid in which it floats.

The delicacy of the A. depends on the distance of the divisions on the scale, or on the thinness of the stem compared with the bulbs. An instrument possessing this advantage cannot be made to serve both for liquids heavier and lighter than water, for the stem would be of an inconvenient length; and it is usual to construct two areometers—one marked with the water-point at the top, and the scale descending to 50, for fluids heavier than water; and the other, with the water-point at the bottom, and the scale ascending to 150, for fluids lighter than water. The scale is generally marked on a slip of paper fixed inside the stem. Gay-Lussac's A. is known also under the name 'volumenometer.' Although it cannot be surpassed either for accuracy or simplicity, it is much less used than other instruments of a similar nature furnished with arbitrary scales, requiring the aid of tables to interpret the readings. The best known of these is Twaddle's A., used in England; and Beaumé's A., extensively adopted on the continent of Europe. The A. with an equally divided scale is a very ancient instrument; it was known among the Greeks under the name of 'baryllion.' On some areometers the divisions are not at equal distances, but are so drawn as to give at once, without table or calculation, the specific gravity of the fluid in which they are placed. Although very desirable, in practice they do not possess the accuracy of the A. with equally divided scales, because the graduation of them is attended with considerable difficulty.

No form of A. can be made to determine specific gravities with perfect accuracy, and such instruments are only useful where a ready and good approximation is all that is needed. They are, in consequence, employed chiefly to ascertain the specific gravity of the various liquors and solutions which occur in the arts and manufactures, and very frequently they are graduated with reference to special liquids, as spirits, wine, milk, brine, etc. The Alcoholometer or Hydrometer of Sykes is an instrument of this latter description, and is used by excise officers for estimating the strength of spirits. It is represented in Fig. 2. BC is a hollow brass ball, surmounted by a flat stem, AB, and loaded below by a short conical stem. CD, terminated by the pear-shaped bulb, D. It is accompanied by eight weights, by which the weight of the instrument may be increased, and the range of the scale extended to fluids heavier as well as lighter than water. One of these weights, W, is shown in the figure; it is furnished with a slit, so as to allow of it being slipped on to the narrowest part, C, of the lower stem. The stem, AB, is graduated into 11 equal parts, and these again into halves; and the instrument is so adjusted that its indications give the volumes of water that must be added to or taken from 100 volumes of the mixture under examination to reduce it to proof spirit (see ALCOHOL), which is a mixture of nearly equal parts of water and alcohol. Thus, if the A. indicates 11 over proof, 11 volumes of water must be added in order to bring the liquid down to proof-

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strength; and 100 gallons of such strength would be reckoned as 111; 100 gallons, at 11 under-proof, would in the same way be charged as 89. Very carefully constructed tables accompany the instrument, in which the specific gravity and percentage of alcohol of different mixtures, at different temperatures, are marked, corresponding to each degree of the A. Since the specific gravity of alcohol is known, it might be thought that if that of a mixture of it with water were known, the relative proportions of each would also be known. This, however, is not the case, for alcohol and water possess a chemical affinity for each other, which causes the combined volumes of the two to measure less than the two volumes separately. Thus, 50 volumes of alcohol mixed with 50 volumes of water do not make 100 volumes of the mixture, but only 96, and thereby the specific gravity of the mixture is higher than it would have been if no contraction had taken place. As the law of this contraction is very complicated, the relative proportions of the two in a combination of given specific gravity are to be estimated only from tables founded upon experimental data.

The peculiar feature of areometers with weights is, that instead of a scale they have only one mark on the stem, to which the A. is in all cases sunk. One of the best-known instruments of this kind is the A. of Nicholson. It consists of a brass tube, BC (Fig. 3), abt. 1 inch in diameter, closed above and below by conical ends, to the upper of which a wire is fixed, carrying on the top of it a cup, A, capable of containing the weights; and to the lower a hook is attached, from which hangs the cup, D. The lower part of the cup, D, is also provided with a hook, and the whole instrument is kept vertical, partly by the weight of the cup, and partly by the weight of the ball, E, suspended from it. On the wire a notch, W, is made, to serve as the mark or fixed point to which the A. is sunk. The specific gravities of liquids are determined by Nicholson's A. in the following way: The weight of the A. itself is first ascertained—let it be in a given case 2,000 gr.—it is then put into water at the temperature 60° F., and weights (say 500 gr.) put in, till it is sunk to W. It is now removed to the liquid under examination; and if the weight required to sink the instrument now to the standard point be only 100 gr. we have the specific gravity of the liquid equal to $\frac{2100}{2500}$ or $\frac{21}{25}$. In both fluids the same volume has been displaced, and that is in each case equal to the weight of the A; but the weight of the A. in the second case was 2,000 + 100, and in the former, 2,000 + 500; hence the above result. Nicholson's A. is seldom used for finding the specific gravity of fluids; its use is almost entirely restricted to ascertaining that of small solid substances, as gems and small pieces of minerals. The following example will show how this is done: If in the cup of the A. already mentioned, when placed in water, the gem be put, and only 440 gr. be then necessary to bring the instrument to W, 60 gr. is manifestly the weight of the gem, because 500 gr. were needed without it to do the same thing. The gem is next placed in the

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lower cup, D, and if 460 gr. are now needed to sink the A. to the standard point, the gem has thus lost 20 gr. of its weight by being immersed in the water. According to the principle of Archimedes (q.v.), these 20 gr. are also the weight of a volume of water equal to that of the gem; so the specific gravity of the gem is $\frac{60}{20}$, or 3. By reversing the cup, D, which is furnished with perforations to allow free passage to the air, and attaching the weight, E, to the handle of it, the specific gravity of substances lighter than water may also be determined by this instrument. The other forms of weight-areometers are those of Fahrenheit, Tralles, and Charles. For the more accurate determination of the specific gravities of liquids and solids, see SPECIFIC GRAVITY

AREOPAGUS, *ăr'ē-ŏp'ă-gŭs* [L.—from Gr. *areĭos*, belonging to Mars: *Arēs*, Mars, and *pagos*, a hill]: a mount lying w. of the Acropolis, at Athens, and celebrated as the spot where the most venerable court of justice in ancient times held its sittings. AREOPAGITE, n. *ăr-ē-ŏp'ă-jīt:* a member of the Areopagus.

It is not easy to determine satisfactorily why the Athenian hill obtained its name; probably it was on account of sacrifices having been offered there in early times to the God of War; but all its historic importance is derived from the Areopagitic Council, the origin of which reaches far back into antiquity, and is ascribed by some to the semi-mythological Cecrops. Orestes, according to tradition, was tried before this court, and it is certain that it must have existed long before the first Messenian war (B.C. 740), for the Messenians, in offering to submit to its decisions certain points of dispute, speak of it, even then, as 'old.' Solon, however, made many changes in its constitution, enlarging its sphere of jurisdiction to such an extent that it ceased to be any longer a mere criminal court, and acquired henceforth social and political powers in addition to the former. Before Solon's time it was strictly oligarchical. It now became a *tertium quid* between aristocracy and democracy, the new qualification for office introduced by Solon being *property* instead of *birth*. It thus naturally allied itself with aristocracy, so that we can perfectly understand why it should have been considered a check upon the impetuous democracy, though it would, perhaps, be fairer to regard it as a check upon both extremes. It is not known how many members were included in its council. The nine archons—if they had recommended themselves by a faithful discharge of their duties—were elected life-members of it. Solon made the council 'overseers of everything,' and we find instances of their manifold authority in the subsequent history of Greece. They granted money, at the time of the Persian invasion, from a reserve treasury of their own, the ordinary public treasury being empty. After the battle of Chæronea, they put to death all who had deserted their country. In social matters, their powers appear to have been curiously minute. They had officers whom they sent or accompanied into private houses, on occasion of a festivity, to see that the rooms were not overcrowded; they

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called to account persons who lived in such riotous extravagance that their example might be considered hurtful to the community, and conferred marks of honor on those of an opposite character. Their sphere of influence seems to have extended to religion also. Innovations in the worship of the gods, neglect of the sacred ceremonies, impiety in any form, brought the offenders under the rebuke and punishment of the A. It is likewise asserted that they possessed and exercised great authority in the education of the young, although this statement, and that regarding some charitable functions attributed to them, are of dubious value.

Until the time of Pericles, the brilliant and powerful ruler of the democracy, the A. maintained its ancient dignity. He soon discovered, however, that unless shorn of its privileges it would prove an insurmountable obstacle to the realization of his designs. Against much vigorous opposition, he succeeded in carrying a decree (B.C. 458), by which, as Aristotle says, the A. was 'mutilated,' and democratic tribunals acquired supreme authority. It is, however, far from being clear what were the precise changes which Pericles effected, whether he abridged its powers as a criminal, or as a social and political, court. From the high estimation in which it was held for centuries after, in the first of these capacities, we are inclined to think that it was its social and political supremacy that was destroyed. Probably the A. was made responsible to the *demos*, or body of citizens. It lingered in life for a very long period. It is heard of as late as A.D. 380, and it seems from the case of the apostle Paul (Acts xvii. 19, 22), that it had in his day a certain authority in religious matters.

AREQUIPA, *â-rā-kē'pâ:* term applied primarily to a mountain in the w. Cordillera of the Peruvian Andes, and secondarily to a city at its foot, being from this again extended to a district, a province, a department, and a diocese. 1. The city, lat. 16° 13′ s., long. 72° 18′ w., is the third largest in Peru, inferior only to Lima and Cuczo. It has considerable trade both with the interior and by sea. Its port is Islay, one of the larger harbors of the republic. Pop. of A. (1890) 32,000.—2. The department is bounded n. by Lima; e. by Ayacucho, Cuzco, and Puno; s. by Moquega, which, with it, forms the diocese; and w. by the Pacific. It is subdivided into seven provinces. Like nearly the whole of the maritime region of Peru, it is generally arid and sterile. Pop. 160,282.—3. The mountain is volcanic, of the form of a truncated cone, and of the height of 20,000 feet. Its neighborhood is subject to earthquakes.

ARÉS: see MARS.

ARETÆUS, *ăr'ē-tē'ŭs:* a famous physician of Cappadocia, who lived in the latter half of the 1st, and in the beginning of the 2d century after Christ. He is considered to rank next to Hippocrates in the skill with which he treated diseases; but he did not, in every instance, follow the practice of the 'Father of Medicine. He was less attentive to 'the natural actions' of the system, which he frequently counteracted, if he thought desirable; admonis

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tered active purgatives copiously, employed narcotics, and did not object to bleeding. He was noted for total want of professional bigotry; hence, not committing himself to any particular set of opinions, in his accuracy in the detail of symptoms and the diagnosis of disease he is superior to most of the ancient physicians. His great work, written in singularly elegant and concise Ionic Greek, is divided into two parts. The first four books treat of the causes and symptoms of acute and chronic diseases; the second, the cure of the same. They are in a state of almost complete preservation, and have been translated into various European languages, besides having been frequently edited in the original. There have been editions by Wigan (Oxford, 1723); Kuhn (Leipzig, 1828); and Ermerius (Utrecht, 1847). An English translation by Reynolds was pub. 1887.

ARETHU'SA: see ALPHEIUS. : ORCHIDACEÆ.

ARETI'NIAN SYLLABLES: the syllables *ut, re, mi, fa, sol, la,* used in music by Guido d'Arezzo for his system of hexachords.

ARETINO, GUIDO: see GUIDO ARETINO.

ARETINO, *â-rā-tē'no:*, PIE'TRO, Italian author: 1492, Mar. 20—1556; b. Arezzo, Tuscany; natural son of a gentleman named Luigi Bacci. Banished from his native town, he went to Perugia, where he wrought as a bookbinder, and gathered up a few scraps of learning, until, seized with a desire of becoming famous, he abandoned his occupation, and wandered through Italy in the service of various noblemen. At Rome, he distinguished himself by his wit, impudence, and talents, and secured even the papal patronage, which, however, he subsequently lost by writing licentious sonnets. A. now went to the Medicean court, where John de' Medici grew so fond of him that he shared his bed with the adventurer, and even procured him an opportunity of ingratiating himself with Francis I. at Milan in 1524. A few years later, he settled at Venice, where also he acquired powerful friends. The Bishop of Vicenza not only soothed the irritation of the pope against A., but also recommended him to the emperor Charles V. The latter, as well as his chivalrous rival, Francis, and other great persons, pensioned the fortunate wit, besides enriching him with splendid presents. He likewise obtained considerable sums for his literary efforts.

Nature had undoubtedly gifted A. with some fine qualities, but these were vitiated by his love of sensual gratifications. His death accorded with the character of his life. It is said that while laughing heartily at some trifling adventure of one of his abandoned sisters, he fell from a stool, and was killed on the spot. His poetical works include five comedies and a tragedy. The former are full of wit and genuine comic humor; the latter is not without merit. His *Sonnetti Lussuriosi* have been translated into French under the title of *Académie des Dames.* Besides these, he wrote a number of other pieces, some of which have not been published. His satire procured for him

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the name of 'the Scourge of Princes,' but it seems clear that he was equally fitted to be their sycophant. Although the very impersonation of licentiousness, he had nevertheless the impudence to publish some books of a devotional kind, with the view of obtaining the favor of the pope.

ARETI'NO, SPINELLO: 1316 (or 1328)–1408; b. Arezzo, Tuscany: early Italian painter of great genius. He studied under Jacopo del Casentino; but before he had attained his majority, he had surpassed his master in the vigor and liveliness both of his conceptions and coloring. His reputation attained its full bloom after he went to Florence, where he painted in fresco, in the chapel of St. Maria Maggiore, several incidents in the life of the Virgin and of San Antonio Abate. The monastery of San Miniato, near Florence, contains to the present day a few of his frescoes. He also adorned the monasteries of San Bernardo at Arezzo, and Monte Oliveto near Florence. Vasari thought that the finest works of A. were those which he executed for the Campo Santo at Pisa, illustrating the life of San Ranieri. Of these, however, we have only prints, and cannot therefore judge satisfactorily. His principal works, still remaining, are those from the life of Pope Alexander III. in the town hall of Siena.

Throughout all Italy, A. was greatly admired for his invention, the grace and simplicity with which he arranged his figures, and the finish of his style. His Madonnas had remarkable sweetness of expression; and his coloring was in most cases bold and beautiful. Vasari prefers him to Giotto.

AREZZO, *â-rĕt'so* (ARETIUM): chief city of the Italian province of A.; in a fertile valley near the confluence of the Chiana with the Arno, lat. 43° 27′ n., long. 11° 52′ e.; 38 m. e.s.e. from Florence. A. is perhaps the oldest town in Tuscany, and was one of the twelve cities of the ancient Etruscans. It was devastated by Sylla during the Social War; and, like many other Italian cities, was sacked by the Goths when they burst into the peninsula. During the contest of the Guelphs and Ghibellines, in a later age, it became subject to Florence, whose troops defeated those of A. at the battle of Camaldino, in which the poet Dante took part. The *Piazza Grande*, the *Pieve*, an old church founded on the site of a heathen temple, and the cathedral, which, like almost all the other churches, has an unfinished façade, are its principal public buildings. The cathedral has a splendid high altar in marble by Giovanni Pisano; and the several churches contain fine specimens of the old Tuscan school of painting. These ecclesiastical decorations are contrasted with the general aspect of the city, which has dark and dirty streets. Its industry is at present at a very low ebb, there being few or no manufactures, and its people are not generally favorites in Italy; but perhaps no city of its size ever produced a greater number of celebrated men, among whom may be mentioned—Mæcenas, the famous patron of letters in the time of the emperor Augustus; Petrarch; Pietro Aretino; Guido de A., inventor of

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the gamut; Leonardo de A., the historian; Cesalpino, the botanist; Redi, the physician; Pope Julius III.; the notorious Marshal d'Ancre; and Vasari, author of *Lives of the Painters*. Michael Angelo was also born in the vicinity of A. Its extensive walls and numerous churches bear record of its more flourishing and more populous period. Pop. (1881) 11,816. The province of A. contains 1,276 sq. m.; is fertile in corn, wine, and oil; pop. (1891) 242,506.

ARGAL, n. *ăr'găl*, or AR'GOL, n. [said to be from Arabic: Gr. *argos*, white]: crude tartar, or impure cream of tartar. It is found as a crust in old wine casks. See ARGOL.

ARGAL, ad. *âr'găl* [a corruption of L. *ergo*]: in *O.E.*, slang for *ergo*, therefore.

AR'GALA: see ADJUTANT.

ARGALI, n. plu. *ăr'gă-lĭ* [native name]: the *Ovis ammon*, or gigantic wild sheep of Siberia and Central Asia. It is found from Kamtchatka to the Himalaya Mountains, where, however, it is seen in only the more elevated regions. 'We came suddenly,' says Dr. Hooker in his *Himalayan Journal*, 'upon a flock of gigantic wild sheep, feeding on scanty tufts of dried sedge and grass; there were twenty-five of these enormous animals, of whose dimensions the term sheep gives no idea; they are very long-legged, stand as high as a calf, and have immense horns, so large that the fox is said to take up his abode in their hollows when detached and bleaching on the barren mountains of Thibet.' The horns of the male are nearly 4 ft. long, and 14 in. in circumference at the base, where they are triangular. The general color is fulvous gray, white beneath, with a whitish disk around the tail. The wool is concealed by hair. The name A. is Mongolian, and was adopted by Pallas. A similar but smaller species also is found on the Himalaya Mountains. The Rocky Mountain Sheep, or Bighorn, is sometimes called the American A. See SHEEP.

Head of the Argali Sheep.

ARGAN (*Argania sideroxylon*, *Sideroxylon spinosum* of Linnæus): a low spiny evergreen tree of the natural order *Sapotaceæ*, native of the southern parts of the kingdom of Morocco, bearing an ovate drupe about the size of a plum, dotted with white, and full of a white milky juice. The Moors extract an oil from the fruit, which they use with their food.

ARGAND, *âr'gănd*, or *âr-gŏn'*, AIMÉ: b. Geneva, abt. the middle of the 18th c.; d. 1803, Oct. 24: physician and chemist. He was the inventor of the well-known *Argand lamp* (q.v.); and early becoming involved in a dispute with

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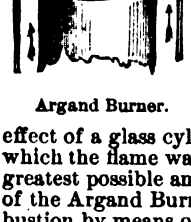
one Langé of Paris regarding the originality of his invention, he went thither to vindicate his claim, but rather than risk the chances of a lawsuit he consented to share the honor, and a patent was obtained by which Langé and A. alone were authorized to make and sell the new lamps in France for 15 years. The French Revolution, however, destroyed their privilege, and A. retired to England. After some time, he returned to his native country, a victim to melancholy and fantastic humors, and died.

ARGAND LAMP, or ARGAND BURNER: a form of wick, or gas-burner, giving a circular flame. The chief difficulties that attended the use of lamps as a source of light were—first, in procuring the complete combustion of the oil, so as to keep the flame from smoking; and second, in preventing the level of the oil in the reservoir from sinking as the combustion goes on. The round cotton-wick, used in the old simple form of lamp, was always attended with smoke and smell. The oils and fats are exceedingly rich in carbon, containing 70 to 80 per cent. of that element, and only 10 to 12 of hydrogen. The round, thick column, then, of oil-vapor rising from the wick of an old-fashioned lamp, presented too little extent of surface to the air; the oxygen of all the air that could get access was chiefly taken up in burning the hydrogen, and a large proportion of the carbon ascended in the burnt air as smoke. A.'s improvement was that he made the wick in the form of a ring. The flame thus became a hollow cylinder with a current of air ascending through the inside, so that the burning surface was doubled. It would appear, however, that the lamp did not satisfy the expectations of A., till his younger brother accidentally discovered the effect of a glass cylinder, as a chimney over the flame, by which the flame was steadied, a draught created, and the greatest possible amount of light yielded. The principle of the Argand Burner for gas is the same—increased combustion by means of an ascending column of air within.



Argand Burner.

ARGAUN': village in the territory of the Nizam; in lat. 21° 2′ n., long. 77° 2′ e.; on the route between Ellichpore and Aurungabad. Its single claim to notice is that, 1803, Nov. 28, about two months after the battle of Assaye, Maj.Gen. Wellesley here gained another victory over the Mahrattas. To commemorate this action, a medal was struck in 1851, about a year before the death of the illustrious conqueror.

ARGEAN, a. *ăr-jē'ăn* [from *Argo*, the ship which carried Jason and his companions to Colchis in quest of the golden fleece]: pertaining to the Argo or the ark.

ARGEL or ARGHEL, *ăr'gĕl* (*Solenostemma A.*, or *Cynanchum A.*): plant of the natural order *Asclepiadaceæ*, native of Arabia and of the north of Africa, deserving notice only because of the frequent use of its leaves for the adulteration of senna. They are lanceolate and leathery, and may read-

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fly be distinguished from genuine senna leaves by their texture, their being downy, their greater heaviness, the comparative absence of veins, and the symmetry of their sides, the sides of the true senna leaves being unequal. They are acrid, and cause sickness and griping, but opinions differ as to their possessing purgative properties.

ARGELANDER, *ăr'gĕh-lăn-dĕr*, FRIEDRICH WILHELM AUGUST: 1799, March 22–1875; b. Memel, Prussia: one of the most eminent astronomers of our time. He studied at Königsberg, where the science of finance first attracted him; but he was subsequently drawn to astronomy by the lectures of Bessel, by whom he was employed to make calculations and observations. In 1820, he was appointed assistant to Bessel in the Königsberg Observatory, and in 1823 succeeded Walbeck as astronomer at the observatory of Abo, in Finland. Here he commenced a series of observations on the fixed stars which have a perceptible 'proper motion.' His studies were unfortunately interrupted by a fire which destroyed the observatory; but after a time he resumed them in a new observatory at Helsingfors, and published a catalogue of not less than 560 stars having 'proper motions.' This contained the results of his observations at Abo, and received from the Academy of St. Petersburg the great Demidov prize. After removing to the University of Bonn in 1837, A. published his *Uranometria Nova* (Berlin, 1843), containing celestial charts of the fixed stars in our hemisphere seen with the naked eye; also (1846) his *Astronomical Observations*, containing the results of an examination of the northern heavens from 45° to 80° declination. His *Atlas of the Heavens* will combine with these works to perpetuate his memory. A. was long engaged in a series of observations on the changes of light in variable stars; he also demonstrated the theory that there is a progressive motion of the solar system in space.

ARGEMONE, *ăr-jē-mō'nē:* genus of plants of the natural order *Papaveraceæ*, distinguished by 4–6 petals, 4–7 radiating concave stigmas, and an obovate capsule, opening by valves at the point. *A. Mexicana*, sometimes called Mexican poppy, is an annual herbaceous plant with large yellow flowers, and sessile, waved and sinuated, spiny leaves, variegated with white. It is a native of Mexico, introduced in southern parts of the United States, and is now common also in many tropical and sub-tropical countries, in which it has been naturalized. Its seeds are narcotic, purgative, and diuretic, exhibiting in a strong degree those qualities of the order of which the seeds of the poppy are devoid. They are used in the West Indies as a substitute for ipecacuanha, also instead of opium; and the juice of the plant is employed as a remedy for ophthalmia.

ARGENS, *ăr-zhŏn'*, JEAN BAPTISTE DE BOYER, MARQUIS D': 1704, June 24—1771, Jan. 11; b. Aix, in Provence. He was originally intended for a learned career; but, from a love of adventure, he entered the army at fifteen. Fascinated by a certain actress, he eloped with her to Spain, but was captured and brought back to Provence. In spite of his glaring breach of discipline, he had the good fortune to be em-

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ployed in the French embassy to Constantinople, and on his return re-entered the army. Being disabled by accidents in military service, and disinherited by his father, he tried his fortune in authorship, and by his *Lettres Juives*, *Lettres Chinoises*, *Lettres Cabalistiques*, and *La Philosophie du Bon Sens* (London, 1737), attracted the notice of Frederick II., then crown prince of Prussia, and became a favorite at the court when Frederick came to the throne. The king appointed him chamberlain, and a director of the Art Academy at Berlin, with a salary of 6,000 livres. He was a constant associate of Frederick, who liked exceedingly his frank and vivacious character, but used to tease him on account of his hypochondriacal fits. When almost a sexagenarian, he renewed the adventures of his youth by again falling a victim to the charms of an actress, Mademoiselle Cochois, whom he married without Frederick's permission. This and other circumstances irritated the despotic monarch, who deprived A. of his pension; and A. returned to Provence, and died at Toulon. His numerous writings, but especially his *Histoire de l'Esprit Humain*, *Lettres et Mémoires*, and those above mentioned, once had considerable reputation.

ARGENSOLA, *ár-hĕn-so'lá*, LUPERCIO and BARTOLOMÉ LEONARDO DE: two of the first among the Spanish poets in the 'golden age,' were born at Barbastro, in Aragon; the former, 1565; the latter, 1566. They died, the former, 1613; the latter, 1631, Feb. 26. They studied at the University of Huesca. Lupercio afterwards went to Madrid, while Bartolomé entered the priesthood. In character, fortune, and career, however, they were closely united. Both were patronized by Maria of Austria, who appointed one her chaplain, and the other her private secretary. The latter was subsequently made chamberlain to the archduke Albert of Austria, and Philip III. appointed him historiographer of Aragon. Bartolomé was employed by the Count de Lemos to edit the *Conquista de las Molucas* (Madrid, 1609), and when this nobleman was appointed viceroy of Naples, both the brothers A., who had acquired fame as poets, attended his court at Naples, where Lupercio, who then filled the office of secretary of state, died. Bartolomé returned to Spain with the viceroy in 1616, and occupied the position formerly held by his brother as historiographer of the kingdom of Aragon, where he proceeded with the work left unfinished by Lupercio—a continuation of Zurita's *Annals of Aragon*. While engaged in this work he died. The collected poems of the two brothers were first pub., 1634, by the son of Lupercio, and passed through several editions. These poems (*Rimas*) consist of epistles, odes, sonnets, and satires, and are singularly alike in character. They are imitative of the style of the Latin poets (especially Horace, for which reason the brothers have been styled 'the Spanish Horaces'), and display more care and polish than originality of invention or richnesss of fancy. Bartolomé A. as a prose-writer is reckoned among the Spanish classics. The style of his continuation of Zurita is a great advance on the original; especially in correctness.

ARGENSON, *ár-zhŏn-sōn'*, MARC PIERRE, COMTE D'.

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1696–1764: celebrated French statesman. He succeeded M. de Breteuil as secretary of state to the war minister 1742. On the death of Cardinal Fleury, in the following year, the whole care of the war then raging devolved on him. He found affairs in a deplorable condition. The French troops were in full retreat across the Rhine; the Austrians already swarmed in Alsace and Lorraine, and the very political existence of France was imperilled; but A., by his vigor and lucky choice of generals, changed in one year the fortunes of the war. After the victories of Fontenoy and Lawfeldt, and the capture of Bergen-op-Zoom peace was secured by the famous treaty of Aix-la-Chapelle, signed 1748. He was an illustrious patron of literature.

ARGENT, n. *âr'jĕnt* [F. *argent*, silver—from L. *argen'tum*, silver; *ârgĕn'tĕŭs*, of the lustre of silver]: the white color in coats of arms: ADJ. silvery: bright. ARGENTINE, a. *âr'jĕn-tĭn*, like silver: N. a mineral. ARGENTAL, a. *âr-jĕn'tăl*, or ARGENTIC, a. *âr-jĕn'tĭk*, of or like silver. ARGENTAN, n. *âr'jĕn'tăn*, German silver. ARGENTATION, n, *âr'jĕn-tā'shŭn*, an overlaying with silver. ARGENTIFEROUS, a. *âr'jĕn-tĭf'ĕr-ŭs* [L. *fero*, I produce]: containing silver. ARGENTITE, n. *âr'jĕn-tīt'*, sulphuret of silver, the most important and richest ore of silver, of a blackish lead-gray color.

ARGENTEUIL, *âr-zhŏn-tŭŭl':* town of France, dept. of Seine et Oise. Its priory, now in ruins, was founded in the 7th c., and was by Charlemagne made a nunnery, of which the famous Heloïse became abbess. Pop. (1891) 13,339.

ARGEN'TEUS CODEX: see ULFILAS.

ARGENTINE, *âr'jĕn-tĭn* (*Argentina*): genus of small fishes of family *Salmonidæ* for the resplendent silvery lustre of their sides, and the abundance of *nacre* (q.v.) on their air-bladder. A. denotes also a silvery siliceous carbonate of lime: also white metal coated with silver.

ARGENTINE, *âr'jĕn-tĭn:* city in Wyandotte co., Kan., near the Kansas river; and on the Atchison Topeka and Santa Fé railroad, 5 m. from Kansas City, Mo. It is in an open farming country; has 1 state bank, and 1 weekly newspaper; and a number of furniture and other industries, including a large smelting and refining establishment. A. has electric light and water works. Pop. (1890) 4,732.

ARGENTINE REPUBLIC: federal republic of S. America, taking its name from the river La Plata ('river of silver,' a misnomer); (see PLATA, RIO DE LA); lat. 22° 30′—56° s., long. at the widest part 54°—70° 31′ w.; 1,125,086 sq. m.; bounded w. by the Andes, which separate the A. from Chile; n. by Bolivia; e. by Paraguay, Brazil, Uruguay, and the Atlantic: southward it extends to Cape Horn. Capital, Buenos Ayres. The islands of Fuegia, on the s., belong partly to it and partly to Chile. The area and pop. by the census of 1895, May 10, were as follows:

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Provinces.	Capitals of Provinces.	Area, sq.m.	Pop.
Littoral: Buenos Ayres	.....	.....	665,245
Buenos Ayres (province)	La Platte	63,000	921,222
Santa Fé	Santa Fé	18,000	405,360
Entre Rios	Concepcion	45,000	302,571
Corrientes	Corrientes	54,000	239,344
Andes: Rioja	Rioja	31,500	70,010
Catamarca	Catamarca	31,500	89,645
San Juan	San Juan	29,700	84,239
Mendoza	Mendoza	54,000	114,814
Central: Cordova	Cordova	54,000	353,000
San Luis	San Luis	18,000	81,537
Santiago del Fstero	Santiago	31,500	160,534
Tucuman	Tucuman	13,500	213,000
Northern: Salta	Salta	45,000	118,107
Jujuy	Jujuy	27,000	55,000
Total		515,700	3,873,626
Territories.			
Misiones		23,932	100,000
Formosa, Chaco		125,612	
Pampa		191,842	
Rio Negro, Neuquen, Chubut, Santa Cruz, Tierra del Fuego		268,000	
Grand total		1,125,086	3,973,626

Principal Cities and Towns, 1895, Aug.

Buenos Ayres (with subs)	615,226	Paraná	18,000
Cordoba	54,400	Salta	20,000
Rosario	124,305	Corrientes	14,000
Tucuman	25,000	La Plata	60,928
Mendoza	28,709	Santa Fé	35,288

Except the most purely Indian districts to the w. of Buenos Ayres, the provinces of the A. R. lie chiefly in the basin of the Rio de La Plata, embracing much the larger half of the same. Mountains abound in the n.w.; and elevated ranges are found also in Entre Rios, which is situated, as its name implies, between the Parana and the Uruguay. But, with these exceptions, nearly the whole country presents boundless plains, covered alterrately with rich pasturage and gigantic thistles. The climate and productions vary considerably—being tropical and temperate respectively to the n. and s. of Corrientes (in 27° 27′ n. lat.). The chief agricultural products are wheat, maize, flax, and linseed; but principal exports are hides, wool, meat, etc. Agriculture is backward, less than one per cent. of the surface being under cultivation. The rearing of live-stock is the great business of the country. Millions of cattle wander at will across the plains, or are kept on breeding-estates of vast extent; and likewise of mules and horses there are immense bands. Besides the Rio de La Plata, which is rather an estuary than a river, and its far-reaching affluents, the hydrography of the A. R. comprises the head-waters of some southern streams, which fall into the open Atlantic, such as the Rio Colorado, the Rio Negro, etc.; and along the w. border under the shadow, as it were, of the Andes, salt-lakes are common. In connec-

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tion, doubtless, with this feature in the hydrography, mines of rock-salt exist, and salt here and there abundantly encrusts the plains, both to the satisfaction and to the benefit of the roaming herds. The names of the country and its estuary are, as already characterized, to a great extent misnomers, yet silver ore, gold, copper, sulphur, coal, and alum have been found near the Andes. Little mining has yet been done. The exports (1890) were as follows: wheat, tons 327,894; maize 707,281; flour 12,017; seeds 830; peanuts 289; potatoes 871; baled hay 19,120; barley 1,308; linseed 30,720. The export of frozen meats was: mutton, tons 20,413, value $1,633,105. The canning of meats is an industry of very recent introduction, but has already reached considerable proportions. The export of hides, hair, horns, tallow, wool, etc. amounted to $4,773,490; of live-stock there were exported: asses 6,793; horses 29,052; sheep 50,002; mules 11,755; horned cattle 150,003. The acreage of sugar plantations was 42,500 acres; product (1889) 35,000 tons of sugar, 8,155,424 litres alcohol. Of wines the exports (1890) were 10,685 litres. The imports were $142,240,812; exports $100,818,993.

The foreign trade of the A. R. 1888–9 was mainly with the following countries:

Countries.	Imports From.		Exports To.	
	1889.	1890.	1889.	1890.
	paper.	*paper.*	*gold.*	*gold.*
Great Britain	$36,820,169	$57,816,510	$14,931,394	$19,299,095
France	30,237,407	19,875,877	38,264,414	26,683,318
Germany	15,477,754	12,301,472	17,120,472	11,566,441
Belgium	13,958,247	10,986,710	16,326,423	12,003,086
United States	16,801,750	9,301,541	7,726,601	6,066,958
Uruguay	7,206,315	5,885,758	5,393,960	5,506,675
Italy	10,188,189	8,663,027	3,930,134	3,194,802
Spain	4,565,470	4,302,284	3,332,115	2,083,817
Brazil	2,607,017	3,354,566	7,522,835	8,442,563
Paraguay	1,377,543	1,724,050	855,292	336,566
Chile	19,509	51,114	2,504,727	2,188,951

The table following shows in dollars the revenue and expenditure for four years:

	1887	1888.	1889.	1890.
Revenue	$58,135,000	$57,651,711	$74,676,706	$73,407,670
Expenditure	51,098 227	50,801,631	50,667,544	92,853,846

The following statement is from an unofficial but trustworthy source in Buenos Ayres: When Gen. Roca retired from power in 1886, the financial condition of the A. R. was as follows: Currency, $70,000,000; debt $117,200,000; revenue (gold) $37,200,000: the value of the currency dollar was then 80 cents gold. In 1890, Aug.: currency $200,000,000; debt, $355,800,000; revenue (gold) $29,200,000; value of the paper dollar, 40 cents gold. In 1891, Nov., the position was: currency $300,000,000; debt $475,000,000; revenue (gold) $22,500,000: value of paper dollar 27½ cents gold.

There were in the A. R. (1891) 7,230 m. of railway. 1890 the railways represented $346,493,054 capital; gross receipts $41,157,486, net profit $14,270,122. Some of the

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railroad companies hold a guarantee of the govt. to make their net income equal to 7 per cent. of their capital. The public expenditure on this account was (1890) $14,693,280.

The state religion is Rom. Cath., but all creeds are tolerated. In 1890 there were 5 theol. seminaries; 3,233 elementary schools, with 7,054 teachers and 260,695 pupils; 16 lyceums for secondary instruction, 450 teachers and 3,127 pupils; 2 universities, 1,007 students; 34 normal schools, with 12,154 students; and mining, agricultural, milit., and naval schools. Under the judicial system each province has its own courts, and there is a national supreme court of five judges and an atty.gen., who also constitute a court of appeals. In all criminal cases the constitution guarantees trial by jury. The executive authority is vested in a pres., elected for 6 years and ineligible for re-election; the legislative in a senate of 30 members, and a house of deputies of 86 members; and the provincial in govs. and legislatures elected by the people. —The army consists of about 7,400 men, besides the national guard of 350,000. The navy consists of 28 vessels —including three iron-clads and 4 torpedo-launches.

History.—In 1515, Juan Diaz da Solis, while searching for a passage into the Great South Sea newly seen by Balboa, entered the Rio de La Plata. In 1526, Sebastian Cabot, son of the discoverer of Newfoundland, penetrated nearly to the confluence of the Parana and the Paraguay, being arrested by the rapids, which afterward gave name to Corrientes. In 1535, Buenos Ayres was founded, to command, though indirectly, the most practical channel of the only outlet of the country, a city which, in conjunction with its own colony of Monte Video, on the opposite bank, has virtually monopolized the history of a region equal in extent to w. Europe. Gradually other cities were planted, partly by colonists from Spain, partly by adventurers from Peru. The chief staples of the country—horses and cattle—had been largely introduced before 1552. Until 1775, the basin of the Rio de La Plata was a dependency of the viceroyalty of Lima. In that year, however, was erected the viceroyalty of Buenos Ayres, which added Bolivia, under the name of Upper Peru, thus embracing the head-waters of the Amazon, and most of the plateau of Titicaca. The year 1806 ushered in a change. Spain, as ally of France, being then at war with England, Buenos Ayres and Monte Video were occupied by the English—a change which though brief, sowed the seeds of revolution by showing the colonists the weakness of their former masters, and moving them to assert their independence. The triumphant militia, after deposing and expelling the legitimate viceroy for cowardice, elected in his stead the French officer who had led them to victory. Napoleon's dethronement of the Bourbons, 1808, occasioned an outbreak throughout Spanish America, and from 1810 the A. R. was in confusion. In 1816, a general congress declared the independence of the 'United Provinces of Rio de La Plata'; but

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those provinces, 1827, returned to a state of isolation. In 1831, Buenos Ayres, Entre Rios, Corrientes, and Santa Fé, sometimes classed as the coast or riverine states, entered into a federal compact, and invited the others to form a voluntary alliance. This Argentine Confederation led to little but anarchy till 1835, when Gen. Rosas was elected capt.gen. or gov. of it, with almost absolute power. He secured order for a time; but his personal ambition, and his policy to make Buenos Ayres supreme, led to his ultimate overthrow 1851. Buenos Ayres refusing to submit to Urquiza, the next gov. of the A. R., declared itself independent 1854, but was compelled by a signal defeat at Cepeda 1859 to re-enter the confederation. Another war, in which its army was ably led by Gen. Mitre, placed that province in its present position of supremacy. In 1865, the A. R. became involved with Brazil and Uruguay in a war against Paraguay, which ended 1870, having accomplished little in the interest or to the credit of A. R. A revolution broke out in Buenos Ayres 1890, July, which resulted in the resignation of Pres. Celman, and the succession of the vice-pres., Carlos Pelligrini. A financial panic prevailed through the summer, and nearly bankrupted the Baring Bros. of London, fiscal agents of the A. R. Luis Saenz-Peña was elected pres. 1892, Apr., and Dr. Uriburu vice-pres. A state of siege had existed during the elections and the week preceding, and many prominent citizens, including the radical candidate for the presidency, Dr. Yrigoyen, were arrested. The govt. professed to have conclusive evidence against the arrested radicals of intended murder and the use of dynamite. The state of siege lasted until after the meeting of the electors in the provincial capitals June 2. The successful candidate, Dr. Luis Saenz-Peña, was supported by the two principal political parties. During the same year a scheme for colonizing Russian Jews in the A. R., patronized by Baron Hirsch of Paris, ended in utter failure after more than 200 Jewish families had settled on the lands apportioned for their use. The land selected for the colony was ill-chosen, and the people were not of the kind to establish pioneer settlements in a new country. In 1892, Aug., 800 of the colonists returned to Europe. The previous year (1891) no fewer than 28,000 persons (other than Jews) returned to Europe; but the tide of 'remigration' seemed to be growing slack 1892, and that of immigration began again to rise; the immigrants in Jan. numbered 4,228.

ARGENTUM, n. *ăr-jĕn'tŭm* [L.]: silver (q.v.); chem. abbreviation. Ag.

AR'GES: genus of small fishes, of the family *Siluridæ*, of extreme interest on account of their being frequently thrown out in vast numbers by some of the S. American volcanoes, with torrents of muddy water. Humboldt was the first accurately to inquire into this wonderful fact, and to describe one of these fishes, which he referred to the genus *Pimelodus*, and called *P. cyclopum*. It is now called *A. cyclopum*. The quantities of these fishes ejected from the volcanoes in the neighborhood of Quito are sometimes

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so great, that the stench of their putrefaction is felt at a great distance, and putrid fevers are caused by it. They are expelled from craters or from lateral openings at an elevation of 16,000 or 17,000 ft. above the sea. It is supposed that they exist in lakes within the cavernous recesses of the mountains, but nothing is positively known on this subject. Their capacity of enduring the high temperature of the water with which they are ejected has excited much interest. Several species are known, to which the common name of *preñadillas* is given in the country, and which are placed by ichthyologists in the genus *A.*, and the closely allied genera *Bronies* and *Astroblepus*.

ARGIL, n. *âr'jĭl* [L. *argil'la*, white clay: F. *argile*]: pure clay; potter's clay. ARGILLACEOUS, a. *âr'jĭl-lā'shŭs* [L. *argillā'cĕŭs*, clayey]: consisting of clay or argil; clayey. AR'GILLIF'EROUS, a. *-lĭf'ĕr-ŭs* [L. *fero*, I produce]: producing clay, or abounding in clay. ARGILLITE, n. *âr'jĭl-līt*, a term applied to clay-slate. Argil is a term now little used, but the derivative *argillaceous* is still in frequent use as descriptive of soils, geological deposits, etc., and in the name *Argillaceous Slate* or *Argillaceous Schist*, instead of which, however, the name *Clay-slate* (q.v.) is more generally employed. The term *argillaceous* is rather vague, and sometimes *clayey*, sometimes *aluminous*, would seem to be its equivalent. See ARGILLACEOUS ROCKS.

ARGILE PLASTIQUE, *âr-jĭl plăs-tĭk:* a series of beds at the base of the Tertiary system in France, resting on a conglomerate or breccia of rolled and angular chalk-flints. They consist of extensive deposits of sand, with occasional beds of plastic clays, used for pottery. Marls occur, inclosing, in some places, the fluviatile shells that are met with in the same position in the London basin, and in other places large numbers of a species of oyster. Beds of impure lignite also occur. The A. P. is the equivalent in the Paris basin of the Woolwich and Reading series, or Lower Eocene of the English geologists. See EOCENE.

ARGILLA'CEOUS ROCKS, *âr'jĭl-lā'shŭs:* all rocks composed entirely or to some extent of clay. Pure clay is known as *kaolin* or *porcelain clay*. It is a hydrated silicate of alumina. Decomposed feldspar, from which the silicates of potash, soda, etc., have been washed out, supplies the material which forms kaolin. *Common clay*, however, contains many impurities; the chief are sand, in variable proportions, and oxide of iron, which gives its color to the mass. Any matter that contains sufficient alumina (more than 10 per cent.) to enable it to retain its shape when molded and pressed, is called clay. Plastic clays occur abundantly in the superficial deposits in the Tertiary strata. The older clays become more or less indurated. When they are regularly laminated, and split into thin layers in the direction of the laminæ, they are called *shale*. In *clay-slate*, the clay has become highly indurated and metamorphosed, so as to split into plates that are altogether independent of the original lamination, and frequently cross it at right angles. Clay-

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slate forms extensive deposits in the Azoic rocks, but it is not confined to these, for the Palæozoic shales are often converted into clay-slate, when, from their proximity to crystalline rocks, or other cause, they have been subjected to the action of heat.

A. R. can generally be distinguished by the peculiar 'argillaceous' odor which they give out when breathed upon.

ARGIVE, n. *âr'jīv* [*Argos*, in Greece]: a Greek; pl. ARGIVI. See ARGOLIS.

ARGOL, or ARGAL (q.v.): a crude variety of cream of tartar which forms a crust in the interior of wine-vats and wine-bottles. Originally, it exists in the juice of the grape, and is soluble therein; but during the fermentation of the juice, and as it passes into wine, much alcohol is developed, which remaining in the fermenting liquor causes the precipitation of the A.; the latter being very sparingly soluble in an alcoholic liquid. Some wines, when they are bottled, are not fully ripe, and more alcohol being thereafter developed, a further precipitation of A. takes place as a crust in the bottles, and hence the meaning of the term *crusted port*. A. is generally of a reddish tinge, obtained from the color of the grapes, but sometimes is of a grayish-white color, when it has been deposited during the fermentation of the juice of colorless grapes. The *red* or *white A.* is denominated in commerce *crude tartar*, and its principal uses are in the preparation of cream of tartar (q.v.) and tartaric acid (q.v.). The constituents of A. are bitartrate of potash (cream of tartar), ($KO,HO,\overline{T}$), tartrate of lime, with coloring and extractive matters.

AR'GOLA: see ADJUTANT.

ARGOLIS, *âr'gō-lĭs:* the n. e. peninsula of the Morea (Greece), lying between the bays of Nauplia and Ægina, forming a nome, or department, in the modern kingdom of Greece. The plain of Argos, famous in ancient times for its breed of horses, is naturally fertile, but is now made pestilential by morasses. It is surrounded by an eastern continuation of the range of mountains on the n. of the Peloponnesus, which also girds the riven and shattered-looking coast. The highest summits attain an elevation of between 5,000 and 6,000 ft. The plain of A. is the most extensive in the whole peninsula, being 12 m. in length, and 5 in breadth. The e. part is higher and more rocky than the west. Near where the plain opens on the sea, the ground is marshy. This was the Lernean Marsh of antiquity. The nome of A. and Corinthia has now Nauplia as its capital, Pop. (1889) 144,836

It was from the importance of the ancient kingdom of A. that the Greeks were collectively often styled Argivi by ancient writers. A. was colonized in very early times. According to the old traditions, Inachus, the Pelasgic chief, settled here B.C. 1800, and Danaus, B.C. 1500, with colonists from Egypt. Here Pelops ruled, and was succeeded by Atreus, Agamemnon, etc. Here also Hercules was born,

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and achieved his victories over the Lernean hydra and the Nemean lion.

The ancient capital, Argos, was situated about 3 m. from the sea, and was considered the oldest city in Greece. It was supposed to have been built by that Inachus of whom we have spoken, or by his grandson Argus; but as the whole period in which his deeds are said to have been accomplished belongs to the unhistorical age, we cannot possibly determine the truth of such a statement. It is certain, however, that at one period A. was the head of a league composed of several Doric states or cities—Cleonæ, Phlius, Sicyon, Trœzen, Hermione, Ægina, and Epidaurus. Latterly, Sparta robbed it of its supremacy and influence. The population of A., during its most prosperous condition in ancient times, was—inclusive of the town-territory—upwards of 100,000. It was noted for the attention it paid to the worship of the gods. Juno was the principal divinity, but many of the other gods had temples and statues also. This gave a stimulus to the fine arts, and we know that A. had one of the most famous of the ancient schools of statuary. The natives were, moreover, renowned for their love of music. Herodotus considered them the finest musicians in Greece. They do not seem to have cultivated literature. Few poets, and no orators or philosophers, were born among them. The modern Argos, built on the site of the ancient, is 7 m. from Nauplia, and is a large and thriving town. It still exhibits some remains of antiquity, though these were nearly wholly destroyed in 1825, during the Greek war of independence. Cotton, vines, and rice are grown. Pop. 11,000.

ARGON, n. *ár'gŏn* [Gr. *a*, without; and *ergon*, work]: elementary gas comprising about ·008 of the weight of the atmosphere. Its discovery, ascribed to Lord Rayleigh in conjunction with Prof. Ramsay,—verbally announced 1894, Aug. 13, but fully described 1895, Jan. 31, at a meeting of the Royal Society of England,—is spoken of as a 'triumph of the last place of decimals,' owing to the extreme delicacy and exactitude of the experiments of the discoverers upon the density of atmospheric gases. Similar investigations had been conducted by Regnault (q.v.); and in 1785 the Hon. Henry Cavendish (q.v.) stood upon the brink of the same discovery. All of the many discoveries of new elements made within the past forty years, have been of rare metals. Not since 1826, when Balard discovered bromine (q.v.), had any addition been made to the list of non-metals. The discovery of A. is considered to rank in lustre with the achievement of Adams and Le Verrier in 1846, whose simultaneous but independent calculations led to the predicted existence at a certain point, and the subsequent discovery there, of the till then unknown planet Neptune.

Nitrogen, when derived chemically, has a constant density differing from the density of atmospheric nitrogen by a constant quantity. It was the attempt to explain this constant difference which led to the discovery of A. A. is obtained by two processes:

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In the first, common air is passed over red-hot copper, which absorbs much of the oxygen, the product being oxide of copper. The remaining gas, largely nitrogen, is then sent through a combustion-tube over more heated copper; a small U-shaped tube containing sulphuric acid, to indicate the rate of flow; a larger, straight tube containing soda-lime and pentoxide of phosphorus, to absorb any moisture or other impurity; and then another combustion tube filled with turnings of the metal magnesium, also raised to intense heat. Magnesium has an affinity for nitrogen, and heat favors their union. The gaseous residue passing thence is crude argon, the principal constituents of air having been almost entirely absorbed on the way through the apparatus.

The second method, a little more expeditious, is to put ordinary air into a closed glass vessel over an alkaline liquid, add a certain amount of free oxygen, and then send powerful electric sparks between the platinum terminals of suitable wires led into the vessel. By means of the intense heat of the electric arc the two gases are made to unite chemically, in a new proportion, and form nitrous acid, which is absorbed by the alkali. Finally, the crude argon is carefully refined by the use of the same substances (heated copper, soda-lime, phosphorus pentoxide, and magnesium) as are employed in the first process.

A. is a colorless, odorless gas; density about 19·90, hydrogen being the unit. It is about two and a-half times as soluble in water as nitrogen, 100 volumes of water dissolving 4·05 volumes of A. at 13·9°. At low temperatures and under high pressure it was first liquefied and solidified by Prof. K. Olszewski of the University of Cracow, the results of whose experiments, with additional figures for comparison, are tabulated as follows, the term 'critical' referring to the degree of temperature and amount of pressure requisite to effect a change from gaseous to liquid form:

Name of substance.	Critical temperature (centigrade).	Critical pressure in atmospheres.	Boiling point.	Freezing point.	Density of gas.	Density of liquid at boiling point.	Color of liquid.
Hydrogen	—220·0°	20·0	?	?	1·0	?	Colorless
Nitrogen.....	—146·0	35·0	—194·4°	—214·0°	14·0	0·885	"
Carbonic ox..	—139·5	35·5	—190·0	—207·0	14·0	?	"
Oxygen.....	—118·8	50·8	—182·7	?	16·0	1·124	Bluish
Argon.....	—121·0	50·6	—187·0	—189·6	19·9	About 1·5	Colorless

Professor William Crookes, F. R. S. E., discovered that in a vacuum-tube A. gives two distinct spectra according to the nature of the induction current employed; but, while the two spectra of nitrogen are of different types, one being a line and the other a band spectrum, those of A. are both line spectra.

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A. is remarkably inert (whence its name). At the time of the announcement of its discovery, none of its affinities were known; but M. Berthelot, a French chemist, soon found, not only that A. was not absolutely inert, but that it was chemically active under normal atmospheric conditions. The silent electric discharge causes it to combine with various organic compounds, notably benzene. It was subsequently extracted chemically by Lord Rayleigh and Prof. Ramsay from cleveite, a rare Norwegian earth, which was incidentally found at the same time to contain helium, a substance theretofore supposed to exist only in the sun and a few of the stars, being indicated in their spectra by a peculiar, simple yellow line.

Many of the properties of A. are still unknown. Its discovery opens up a great field for research. In view of its wide distribution, much time must probably elapse before its functions in the economy of both organic and inorganic nature can be fully determined. The atomicity of A. is a vexed question, though it is considered probably monatomic with atomic weight 40, approximately twice the density. Data bearing on this question point to a conflict of authority between the long-accepted periodic law of classification of the elements according to their atomic weights, discovered by Mendeléeff, and conclusions drawn from the ratio of specific heat at constant volume to that at constant pressure—thus possibly necessitating modification of chemical theory. A. is supposed by M. Berthelot to have some causal connection with the *aurora borealis*.

ARGONAUT, n. *âr'gō-nawt* [L. *argonau'ta:* Gr. *argonau'tēs*, an Argonaut—from *Argo*, Jason's ship: Gr. *nautēs*, a sailor (see ARGEAN)]: one who sailed in the ship *Argo;* the paper-nautilus, a cephalopodous mollusk. ARGOSY, n. *âr'gō'sĭ* [Sp. *Argos*, the *Argo*]: a merchant-ship richly laden; a large merchant-ship.

AR'GONAUT (*Argonauta*): genus of cephalapodous Mollusca, generally known by the name of *Paper Nautilus*, and in consequence of similarity in the form of the shell, often confounded with the genus *Nautilus* (q.v.), but in fact much more nearly allied to the Poulpe (*Octopus*). The shell is not chambered like that of the true nautilus, but has one spiral cavity, into which the animal can entirely withdraw itself. The animal has no muscular attachment to the shell, and some naturalists therefore suspected that it might be merely, like the Hermit Crab, the inhabitant of a shell originally belonging to some other animal; but this question has been set at rest by the observations of Madame Power, proving the beautiful but fragile shell to be the production of the A. itself. It has, however, also been discovered that the shell is peculiar to the female A., and does not answer the ordinary purposes of the shells of mollusca, but rather that of an 'incubating and protective nest.' The eggs, which are very numerous, are attached to filamentary stalks, and by these the whole compacted mass is united to

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the involuted spire of the shell, where it is usually concealed by the body of the parent. The descriptions, until recently admitted into the works of the most reputable naturalists, of argonauts sailing about in pretty little fleets upon the surface of the water, employing six of their tentacula as oars, and speading out two, which are broadly expanded

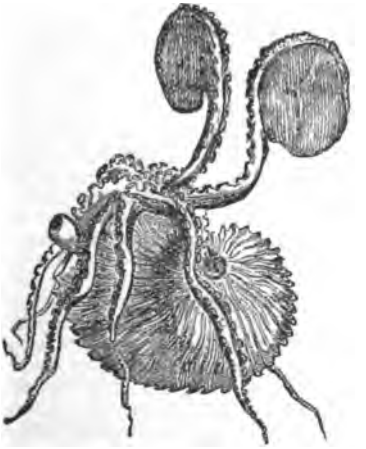

FIG. 1.

for the purpose, as sails to catch the breeze, are now regarded as entirely fabulous, and indeed are founded upon a misapprehension of the position of the animal in its shell, and of the use of the two expanded arms or *vela* (sails). The membranes of these arms are extended at the pleasure of the animal, so as to envelop the shell, and appear to be

FIG. 2.

the secreting organs employed in its fabrication. Two species of A. are common in the Mediterranean. Fig. 1 represents one of them as it used to be commonly repre sented with oars and sails. Fig. 2 represents it as it really exists, with the membranes of the dorsal arms covering the shell. The other arms are cut off At *a*, in Fig. 2, is seen the mass of eggs.

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ARGONAUTS, *ár'gō-nawts:* heroes of Greek antiquity [so named from their ship *Argo*], who, according to tradition, about a generation before the Trojan war, undertook a long voyage into unknown seas, under the command of Jason. Homer alludes to the story; Hesiod, Mimnermus, Pindar, the Pseudo-Orpheus, and many others relate it, all in different ways, the accounts in some instances being utterly irreconcilable. The plainest and most complete narrative is that of Apollodorus, as follows: Jason was commissioned by his uncle, Pelias—who ruled over Iolcus, in Thessaly—to fetch from the country of Æetes (Colchis) the golden fleece of the ram, which was suspended on an oak, and guarded by a sleepless dragon. He therefore caused Argus, the son of Phrixus, to build a ship of 50 oars; and in pursuit of this adventure gathered together the choicest heroes from all parts of Greece, 50 in number, with whom he sailed. The first landing-place was Lemnos, where the A. stayed two years, because the women, in consequence of the wrath of Aphrodite, had slain all the men, excepting Thoas. Next they sailed to the Doliones, and were hospitably received by King Cizycus, who was afterwards accidentally killed by Jason. After landing at Mysia, where they left Hercules and Polyphemus—who had wandered too far inland in pursuit of the lost Hylas—they came to the country of the Bebryces, where King Amycus was killed by Pollux, or Polydeuces, in a pugilistic fight. They next sailed along the coast of Thrace to Salmydessus, where two of their number, Zetes and Calais, having delivered the blind seer, Phineus, from certain winged monsters called Harpies, he in return gave them good counsel respecting their future adventures, and especially warned them against the dangerous passage between the opening and closing Symplegades, from which they escaped with but little injury to their vessel. The story goes that Phineus advised the A. to let loose a dove when they approached the dreaded rocks, and to judge from its fortune what they themselves might expect. The bird escaped with the loss of its tail. The A. resolved to risk the passage, and after heroic efforts got safely through, their ship only losing some of the ornaments of its stern. After visiting several other lands, they arrived at the mouth of the river Phasis in Colchis. Here the king, Æetes, promised to give up the golden fleece to Jason, on condition that the latter should yoke to a plough the two fire-breathing bulls with brazen hoofs, and should sow the dragon's teeth left by Cadmus in Thebes. Jason, by the help of the famous sorceress Medea, daughter of Æetes, who had fallen passionately in love with the bold navigator, fulfilled these conditions; and was also assisted by Medea in still more wonderful exploits. He obtained from her, under promise of marriage, a charm against fire and steel, and was enabled to destroy all the warriors who sprang up from the land sown with the dragon's teeth. While this was taking place, Æetes had resolved to burn the ship *Argo*, and put to death the crew; but Jason, informed of the scheme by Medea, anticipated it, hastened into the

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grove, stupefied the dragon-sentinel by an opiate charm prepared by Medea, seized the golden fleece, and, embarking in the *Argo* with his mistress and her brother Absyrtus, sailed away from Colchis by night. Æetes followed, but was hindered in his pursuit by an atrocity committed by his fierce daughter. It is said that she slew her brother Absyrtus, and cut him into several pieces, which she threw overboard, one at a time. While King Æetes stayed to gather up the fragments of his son, Jason escaped from the pursuit. The A. now reached the mouth of the river Eridanus; but were driven on the Absyrtian Islands by a storm sent from Jove who was angry on account of the murder of Absyrtus. Meanwhile the mast of the *Argo*—which had been cut from the sacred grove of Dodona—delivered an oracle to the effect that Jove could not be appeased unless they sailed towards Ausonia, and were purified through the expiatory agency of Circe. This was accomplished; and, next, the A. passed by the Sirens, from whose charms they were preserved by Orpheus, who sang to them, but could not hinder one of their number, Butes, from swimming off to the sea-maidens; then through Scylla and Charybdis, by the help of Thetis, and at length landed on the island of Corcyra, where Alcinous ruled. On leaving this place, they encountered a storm at night, but were saved by Apollo, who, in flashes of lightning, revealed to them the haven of Anaphe, where they raised an altar to their preserver. At Crete, their landing was opposed by the giant Talus, who was slain by Medea. They subsequently touched at Ægina, and, sailing between Eubœa and Locris, arrived safely at Iolcus, after a four months' voyage. Jason dedicated the good ship *Argo* to Neptune, at the Isthmus of Corinth.

It is perhaps useless to speculate on the real character of the Argonautic expedition, even if it be more than a mere myth. The accounts given by other writers differ so widely, especially in the geographical parts, from those of Apollodorus, that it becomes impossible to determine satisfactorily whether the expedition sailed north, east, or west. The common historical interpretation of the legend is that Jason sailed on a voyage of discovery, which had for its aim and stimulus the hope of new commercial relations; others would modify this hypothesis, and suggest that the enterprise was partly commercial, partly piratical, and partly adventurous, and that Jason's crew was in all probability composed of young, restless, and ambitious spirits, who were ready for anything that might turn up.

ARGOS: see ARGOLIS.

ARGOSTOLI, *ăr-gŏs'tō-lē:* seaport on the s.w. of Cephalonia; cap. of the island; lat. 38° 10′ n., long. 19° 59′ e.; its quay is a mile long. Pop. 8,000.

ARGOT, n. *ăr-gŏt* [F. *argot*, slang]: one of the wanderers or waifs of society; the secret or cant language of London thieves.

ARGOVIE: see AARGAU.

ARGUE, v. *ăr'gū* [L. *argu'ĕrĕ*, to declare; F. *arguer;*

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lt. *arguire—lit.*, to make clear]: to debate or discuss; to reason; to dispute. AR'GUING, imp. ARGUED, pp. *ár'-gūd.* AR'GUER, n. one who argues. ARGUMENT, n. *ár'gū-mĕnt*, a reason alleged or offered; a discussion. ARGUMENTABLE, a. *ár'gū-mĕn'tă-bl*, that may be argued. AR'GUMENTA'TION, n. *-tā'shŭn*, reasoning; the act of reasoning. AR'GUMEN'TATIVE, a. *-tă-tĭv*, consisting of argument; given to argument. AR'GUMEN'TATIVELY, ad. *tĭv-lĭ.* AR'GUMEN'TATIVENESS, n. the quality of being argumentative.—SYN of 'argue': to debate; dispute; deliberate; discuss; contend; evince; reason; expostulate; remonstrate; manifest; prove;—of 'argument': argumentation; reason; reasoning; discussion; controversy; proof.

ARGUELLES, *ár-gwĕl'yĕs*, AUGUSTIN: a prominent Spanish politician 1776, Aug. 28-1844. Mar. 23. b. Ribadesella. On the breaking out of the war of independence in 1808, he went to Cadiz, where he agitated for the organization of a regency, with a free constitution, as the best method of consolidating the resources of the nation. In 1812, he was sent as representative of his native province to the cortes, where he was appointed one of the members of the committee to whom was intrusted the drawing up of the plan of a new constitution. His splendid talents as a public speaker soon won him the admiration of the liberal party, who used to term him the Spanish Cicero. But on the return of Ferdinand VII., A. fell a victim to the reactionary spirit which ensued, and, 1814, May 10, he was arrested and imprisoned; but at his trial he displayed such dexterity that it was found impossible to convict him. Different judges were nominated five successive times, but they could not agree in their decision. At last the monarch himself passed sentence, which was, that A. should be confined for ten years in the prison at Ceuta. He was not, however, alone in his misfortunes. Fourteen persons were condemned with him, among whom was his friend Juan Alvarez Guerra. In their confinement they experienced such barbarous treatment that in four years three died, two became mad, and the rest received grievous injuries. The revolution of 1820 restored them to freedom. A. became minister of the interior, but soon resigned, in consequence of the king complaining of the weakness of the executive. Although provoked beyond measure by the narrow bigotry of the court, he did not rush into extremes, but continued a constitutional liberal to the end of his life. In the cortes at Seville in 1823, he voted for the suspension of the royal power; but after the violation of the constitution he fled to England, where he remained till the amnesty of 1832. On his return to Spain, being nominated to the cortes, he was repeatedly made president and vice-president of the chamber of deputies, and always showed himself a moderate but unwavering reformer. In July, 1841, on the discussion of the law regarding the sale of church property, he delivered himself strongly against all concordats with the pope. Next to Espartero, he was the most popular man in the kingdom with the enlightened party. During the regency, he was appointed guardian to the

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young queen, Isabella, but died soon after at Madrid. In his old age he still exhibited the fiery eloquence that marked his youth.

AR'GUMENT, in Logic: properly, the ground or premise on which a conclusion is rested; popularly it is applied to a series of reasons alleged, or to a controversy. *Argumentation* is reasoning put into regular shape, with a view to convince or silence an objector. Logicians have given distinctive names to various kinds of arguments. Thus, we have the *Argumentum ad hominem*, which is no real proof, but only an appeal to the known prepossessions or admissions of the persons addressed. In this style, when a man upholds one method of fraud, he may, by an appeal to his consistency, be driven to uphold another. The A. *ad veritatem*, again, has no regard to anything save objective truth. Next we have the A. *e consensu gentium*, or an appeal to the common belief of mankind, which, of course, may be used to prove or disprove anything. The A. *a tuto* rests upon the supposed safety or prudence of adopting a certain conclusion. It is sometimes used by Roman Catholics against Protestants in the following form: Protestants teach that salvation is possible in any church; this is denied by Catholics; therefore, it is safer to belong to the Catholic Church, as even the Protestant admits that a man may be saved in that church. Lastly, the *Argumentum a baculo* (or use of the cudgel), though objectionable, may be called concise in its style, and has settled many controversies.

ARGUMEN'TUM AD HOM'INEM: see ARGUMENT.

ARGUS, n. *ăr'gŭs:* in Gr. and L. Myth., son of Zeus and Niobe, succeeded Phoroneus in the government of the Peloponnesus, which took from him its name of Argos, as did also the territory of Argolis.

ARGUS, a fabled being surnamed Panoptes (all-seeing), had one hundred eyes, some of which were always awake. He was enormously strong, and on account of his wonderful exploits Juno appointed him to watch over Io, transformed into a cow. Mercury being commissioned by Zeus to carry off the cow, slew A. by stoning him; or, as Ovid says, first charmed him to sleep by playing on the flute, and then beheaded him. Juno used the eyes of A. to decorate the peacock's tail. The name A. is used to designate a very watchful person.

ARGUS: the builder of the ship *Argo*. See ARGONAUTS.

AR'GUS or ARGUS PHEASANT: genus of gallinaceous birds, remarkable for magnificence of plumage. The only known species is *A. giganteus*, formerly called *Phasianus A.*, and still, very generally, the A. pheasant. The sides of the head and neck are destitute of feathers; the tail consists of twelve feathers, of which the two middle ones in the male are very much elongated; the secondary feathers of the wings are much longer than the primary. The name A. has allusion to the many beautiful eye-like markings which adorn the plumage of the male, and particularly the secondaries of the wings. The long secondaries are said to impede the flight of the bird; but

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its wings are much employed to aid it in running. The female is of comparatively tame plumage, not only wanting the eye-like markings, but even the great length of the secondaries and of the middle tail-feathers. The size of the bird, when divested of its plumage, is not much greater than that of a common barn-door fowl, but the tail-feathers

Argus Pheasant (*A. giganteus*).

of the male are nearly four ft. long. The A. is a native of Sumatra and other eastern islands, of the peninsula of Malacca, Siam, etc. It is said to be found even in the n. parts of China. It is impatient of confinement, and has very seldom been brought alive to Europe.

ARGUTE, a. *ár'gūt* [L. *argūtus*, sharp, piercing]: acute; shrewd; subtile. ARGUTE'NESS, n. acuteness or wittiness.

ARGYLL, *ár-gīl'*, ARCHIBALD CAMPBELL, Marquis of, 1598–1661: an eminent political character of the 17th c.; succeeded to the earldom of A. 1638. Already he had shown that religious principle which marked his whole life, and that perilous union of attachment to the king and of faith in the principles against which the king made war. In the general assembly at Glasgow, 1638, Nov., he ópenly took the side of the Covenanters, and thenceforth became recognized as their political head. In 1640, he commanded a military expedition through Badenoch, Athole, Mar, and Angus, for the purpose of enforcing subjection to the Scottish parliament. On the king's visit to Scotland, in 1641, he found it convenient to show peculiar favor to A., and created him a marquis. On the breaking out of hostilities, A. was still desirous for negotiation, but was finally compelled to take the field. In April, 1644, he dispersed the royalist forces under the Marquis of Huntly, in Aberdeenshire. He was less successful in withstanding

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the genius of Montrose, who, 1645, Feb. 2, almost annihilated his army at Inverlochy. His estates had suffered so much in the preceding year from the ravages of the brilliant cavalier, that a sum of public money was voted for his support. In Aug., 1646, he went to London, with Loudon and Dunfermline, to treat with the parliament for a mitigation of the articles presented to the king. He was at the same time the bearer of a secret commission from the king to treat with the Duke of Richmond and the Marquis of Hertford, on the propriety of a Scottish demonstration in favor of Charles. On the defeat of the 'Engagement' plan, to which he had been decidedly opposed, the government of Scotland devolved on A. and the other Presbyterian leaders. In the parliament of Feb. 1649, Charles II. was proclamed king, and at Scone, 1651, Jan. 1, A. put the crown on his head. At this time it was even said that the complaisant monarch intended to marry one of his daughters. As head of the committee of estates, A. took vigorous measures to oppose Cromwell's invasion of Scotland, and still adhered to the king, after the subjugation of the country. After the battle of Worcester, he retired to Inverary, where he held out for a year against Cromwell's troops. Falling sick, he was taken prisoner by General Dean. He refused submission to the Protector, but took an engagement to leave peaceably, which he strictly kept. On the Restoration, he repaired to Whitehall, encouraged by a flattering letter from the king to his son. Impeached with the crime of having submitted to the usurper (to whom he had refused allegiance), he was committed to the Tower, and 1661, Feb. 13, was brought before the Scottish parliament on the charge of treason. He defended himself with spirit, but in vain. He was condemned, and suffered death at Edinburgh, May 27, having displayed dignity and meekness through his trial, and on the scaffold.

ARGYLL, Archibald (Campbell), 9th Earl of: son of Archibald Campbell, Marquis of A.: was early distinguished by personal accomplishments, and exhibited great bravery on the disastrous day of Dunbar, where he commanded a regiment on the royal side. After Worcester, he continued, like his father, in arms, and made himself so obnoxious to the parliamentary leaders, that he was specially excepted by Cromwell from the act of grace in 1654. After much harassing persecution, he submitted to the parliament, but continued to be closely watched. On the restoration of Charles II., he was received into high favor (as a balance to the execution of the death sentence on his father), and, unfortunately for his own fame, participated in some of the iniquitous acts of the Scottish legislature. He had, however, numerous and active enemies; and, on the ground of an intercepted letter, in which he had complained of neglect, he was tried and condemned to death by the Scottish parliament for the imaginary crime of *læsa majestas*. The influence of Clarendon restored him to liberty and favor; even the king himself was favorable to him; but his explanation in

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subscribing the infamous test framed by the Scottish parliament in 1681 was declared treasonable, and he was again condemned to death. The devotion of his wife enabled him to escape from Edinburgh Castle in the disguise of a page; and after remaining concealed some time, he fled to Holland. Landing in the n. of Scotland, 1685, May, with an armed force, to co-operate in the revolt of Monmouth, he was, after a series of misfortunes, taken prisoner, hastily condemned, and beheaded 1685, June 30. His son Archibald, one of the deputation sent by the Scottish convention to present the crown to the Prince of Orange, was created Duke of Argyll, 1701.

ARGYLL, George John Douglas (Campbell), 8th Duke of: b. 1823; succeeded his father in 1847. At the age of 19, his grace, then Marquis of Lorne, wrote a pamphlet entitled *A Letter to the Peers from a Peer's Son*, on the subject of the struggle which ended in the disruption of the Scottish Church. Seven years later he published an essay on Presbytery, which contains a historical vindication of the Presbyterian system. On taking his seat in the house of peers, he soon commanded the respect of that dignified assembly. On the formation of the coalition ministry by Lord Aberdeen, his grace was invested with the office of Lord Privy Seal, which he continued to hold in Lord Palmerston's administration. In 1855, he became postmaster-general. In Palmerston's next ministry, formed in 1859, he again successively held the same office. Mr. Gladstone appointed him secretary of state for India in 1868 and again in 1880. He resigned office in 1881, disapproving the Irish Land Bill. In 1874, he had supported the abolition of patronage in the Church of Scotland. In 1854, he was chosen lord rector of the Univ. of Glasgow: in 1855, presided at a meeting of the British Assoc. in that city; and in 1861, was elected president of the Royal Soc. of Edinburgh. His grace is hereditary master of the queen's household in Scotland, chancellor of the Univ. of St. Andrews, a trustee of the British Museum, also hereditary sheriff and lord-lieut. of Argyleshire. Besides numerous papers on zoology, geology, etc., he has written *The Reign of Law*, 1866; *Primeval Man*, 1869; and, in 1870, *A History of the Antiquities of Iona*. An important work by him on the *Unity of Nature* appeared 1884. His eldest son, the Marquis of Lorne, married the princess Louise in 1871; and in 1878 was appointed governor-general of Canada. (In the ducal title A. was formerly spelt Argyle.)

ARGYLL, John (Campbell), 2d Duke of: 1678–1743, Sept. 3: son of the first Duke of A.: took an important part in the political and military affairs of his time. As royal commissioner in 1705, he had a principal share in bringing about the Act of Union. As a soldier, he distinguished himself under Marlborough at Ramillies, Oudenarde, Lille, Ghent, and Malplaquet. Previous to the change of ministry in 1710, A. had been a keen whig. He now veered with the wind of the court, and became a declaimer against the Duke of Marlborough. As the

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reward of his apostasy, he was appointed by the tories generalissimo of the British army in Spain; but considering himself unhandsomely treated by the ministry, he shortly afterwards returned, and finding his influence greatly diminished, he again became a whig. His career up to the rebellion of 1715 was most tortuous and unprincipled, and seriously detracts from his meritorious services during that critical period. He was, however, completely successful in quelling disturbances, and his services were rewarded in 1718, among other dignities, with an English peerage, and the title of Duke of Greenwich. His restless vanity and ambition, however constantly prompted him to political intrigues. In 1721, he again played into the hands of the tories, for the purpose of securing the entire patronage of Scotland. In 1737, he rose into immense popularity in his own country, by his spirited defense before parliament of the city of Edinburgh in regard to the Porteous mob. He died on the 3d Sept. 1743. He was a man of lax principles and selfish character, but possessed of considerable shrewdness and talent, and noted for kindness and courtesy in private life, which procured him the title of "the good Duke of Argyll."

ARGYLESHIRE, *ár-gil'shér* [*Airer-Gaedhil*, territory of the Gael]: a county in the w. of Scotland, cut up into many peninsulas by arms of the sea, and including numerous islands. It is bounded n. by Inverness-shire; w. and s. by the sea; e. by Perthshire, Dumbarton, Loch Long, and Firth of Clyde. Its greatest length is about 115 m.; greatest breadth, about 60 m.; its extent of coast-line is very great, amounting to 663 m., owing to the indentation of the coast by numerous lochs running inland. Next to Inverness, it is the largest county in Scotland—area, 3,210 sq. m., of which 1,063 are occupied by the numerous islands. No part is above 12 m. from the sea or from large inland lochs. The county is divided into the districts of Cantire, North and South Argyle, Lorn, Appin, Cowal, Morven, and Sunart. The chief islands are Mull, Islay, Jura, Tiree, Coll, Lismore, and Colonsay, with Iona and Staffa. There are upwards of thirty other islands of smaller size. The general aspect of A. is wild and picturesque, marked by rugged and lofty mountains and deep inland bays. There are some fertile valleys. The n. part is entirely mountainous, and presents some of the grandest scenery in Scotland, as Glencoe. The highest peaks are Bidean nam Bian, 3,766 ft.; Benloy, 3,708; Ben Cruachan, 3,689; Ben Starav, 3,541; Ben Doran, 3,523; Buachaille Etive, 3,345; Ben-a-Bheithir, 3,362; Culvain, 3,224; Sgor Dhomhail, 2,915; Ben More (Mull), 3,185. The chief bays are (going south)—Loch Moidart, Loch Sunart, Linnhe Loch, branching off into Loch Eil and Loch Leven, Loch Fyne, and Loch Long. There are no rivers of any size. The streams are short and rapid, the principal being the Urchay, running through Glenorchy into Loch Awe, and the Awe, connecting that lake with Loch Etive. The inland or fresh-water lochs are Loch Awe and Loch Lydoch. The rocks of A. are mica-slate,

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which predominates on the mainland: trap in Mull and Lorn; quartz rock in Islay and Jura; granite around Loch Etive and in Knapdale; patches of lias and oolite in many of the isles; and a little old red sandstone w. of Loch Fyne and in South Cantire. Lead-mines occur at Strontian (where the mineral Strontianite was discovered, and from which the names of the earth called *Strontia* and the metal *Strontium* are derived), at Tyndrum, and in Islay and Coll. There is a copper-mine in Islay. The Easdale and Ballachulish quarries supply the best roofing-slates in Scotland. Coal occurs near Campbelton; fine marble in Tiree, etc.; excellent granite near Inverary; and limestone in most parts of the county. The fertile parts of A. lie along the arms of the sea and the mountain streams. The soil is mostly a light, sandy, and gravelly loam, along the coasts and the sides of rivers, and gravelly, with a till bottom, on the hillsides. Sheep and cattle rearing are the chief occupations of the farmer. More sheep are reared in A. than in any other Scotch county, and nearly a million acres are in permanent pasture. In number of cattle, A. yields only to the counties of Aberdeen, Ayr, Lanark, and Perth. In 1881, A. had 24,481 acres under grain, and 12,990 under green crops, as well as 60,154 acres under permanent pasture, exclusive of heath, or mountain land. A. abounds in deer and game. Loch Fyne is famed for its herrings. Loch Awe abounds in salmon and trout.

In many parts of A. the peasantry are still very poor, notwithstanding that steamers now connect every portion of the coast with the commercial centre of Scotland. The manufactures are unimportant, the chief being whisky, in Campbelton and Islay, and coarse woolens for home use. The chief towns and villages are Inverary, Campbelton, Oban, Dunoon, Lochgilphead, Tarbert, and Tobermory. The three former unite with Ayr and Irvine in returning one member to parliament; the county returns another. This extensive county is divided ecclesiastically into not more than fifty parishes, which contain only two royal burghs, Inverary and Campbelton, the former of which is a station of the Circuit Court of Justiciary. The principal proprietors are the Duke of Argyle, the head, and the Earl of Breadalbane, a branch of the Campbell family. Among the antiquities of A. are the ruins of Iona and Oronsay, and many *duns*, or circular forts, along the coast. In Cantire formerly lived the Macdonalds, or Lords of the Isles, whose power was weakened by James III. Pop. (1871) 75,679; (1881) 76,440, mostly using the Gaelic language; a considerable decrease since 1881, chiefly from emigration; (1891) 74,085.

ARGYNNIS: a name of Venus (q.v.).

ARIA, n. *ār'ĭ-ă* [It. *arĭă;* F. *air*, breath—from L. *ăĕr*, air]: an air or tune, in *music;* a rhythmical song, as distinct from recitative. The term was formerly applied to a measured lyrical piece either for one or several voices; but is now commonly applied to a song introduced in a cantata, oratorio, or opera, and intended for one voice

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supported by instruments. ARIETTA or ARIETTE, a short melody or tune. ARIOSO, a passage in the style of the A., often introduced into recitative. A. BUFFO, a comic song, etc.

ARIADNE, *ā'rĭ-ăd'nē:* in Legend, daughter of Minos, king of Crete, by Pasiphaë. When Theseus, with the offerings of the Athenians for the Minotaur, landed in Crete, A. conceived a passion for the beautiful stranger, and gave him a clew by means of which he threaded the mazes of the labyrinth, and was enabled to slay the monster. For this service Theseus promised to marry her, and she escaped with him, but was slain by Diana on the island of Naxos.—According to another tradition, A. was left by Theseus at Naxos, where she was found by Bacchus returning from his triumph in India, who was captivated by her beauty, and married her. At her death he gave her a place among the gods, and suspended her wedding-crown as a constellation in the sky. A., as left forsaken by Theseus, and as married to Bacchus, has been a favorite subject with artists.

ARIALDUS, *a-rĭ-al'dus:* a deacon of the church of Milan, during the 11th c.; prominent in the ecclesiastical contentions of his times. The Rom. Cath. Church in the n. of Italy was then very corrupt, a wide-spread licentiousness, originating from the unnatural institution of priestly celibacy, prevailing. Great numbers of the clergy kept concubines openly. Such as looked earnestly in those days at this flagrant evil were disposed to consider the strict enforcement of celibacy the only effectual cure. Chief among these reformers stood A., whose life was one continued scene of violent controversy. Although successively sanctioned by Popes Stephen X., Nicholas II., and Alexander II., he found little sympathy among his brethren, and used to complain that he could get only laymen to assist him in his agitation. Having at length succeeded in obtaining a papal bull of excommunication against the Abp. of Milan, a fierce tumult ensued in the city, whose inhabitants declared against A. and his coadjutors. A. now fled to the country; but his hiding-place being betrayed, he was conveyed captive to a desert isle in Lake Maggiore, where he was murdered by the emissaries of the abp., and his remains thrown into the lake, 1066, June 28. He was afterwards canonized by Pope Alexander II.

ARIAN, n. *ā'rĭ-ăn:* one adhering to the doctrines of *Arĭŭs*, who taught that Jesus was inferior to God, and that the Holy Spirit is not God: ADJ. pertaining to Arius. ARIANISM, n. *ā'rĭ-ăn-ĭsm*, the doctrines of the Arians. See ARIUS.

ARIA'NA: see ARYAN RACE.

ARIANO, *ā-rē-ā'nō* (*Arianum*): city of s. Italy, province of Avelino, beautifully situated, 2,800 ft. above the sea, in one of the most frequented passes of the Apennines; 50 m. n.e. from Naples. It is a bishop's seat, and has a fine cathedral. Pop. 12,600.

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ARIAS MONTANUS, *a'rĭ-ăs mŏn-tā'nŭs*, BENEDICTUS: 1527–1598: b. in the village of Frexenal de la Sierra, among the mountains separating Estremadura from Andalusia: a Rom. Cath. divine, noted as a linguist. He studied at Seville and Alcalá de Henares, where he distinguished himself in the acquisition of Arabic, Syriac, and Chaldee. On a tour through Italy, France, Germany, England, and the Netherlands, he obtained a knowledge of various modern tongues. He was at the celebrated Council of Trent; but on his return to his own country he gave his whole time to literature. In 1568, Philip II. persuaded him to superintend at Antwerp the publication of the famous edition of the 'Polyglot Bible,' executed in that city at the suggestion of the printer, Christopher Plantin. After four years' labor the work, issued under the title *Biblia Sacra, Hebraice, Chaldaice, Græce, et Latine, Philippi II. Regis Catholici Pietate et Studio ad Sacrosanctæ Ecclesiæ Usum Chph. Plantinus excudebat*, was received with universal applause; though the Jesuits, to whom A. was strenuously opposed, alone attempted to fasten the charge of heresy on the author, who made several journeys to Rome to clear himself of the accusation. Philip II. rewarded him with a pension of 2,000 ducats, besides various other emoluments. He died at Seville. His literary works are very numerous. They relate principally to the Bible and to Jewish antiquities; but he also wrote a poem on Rhetoric, and a History of Nature.

ARICA, *â-rē'kâ:* seaport of Tachna, the most s. department of Peru; lat. 18° 28′ s., long. 70° 24′ w. Though it has merely a roadstead, it affords safe anchorage to shipping, and is one of the chief outlets of the trade of Bolivia, being connected with La Paz in that republic by a mulepath which leads across the west Cordillera of the Andes. Its exports mostly consist of copper, silver, alpaca, wood, and guano. A. has frequently suffered from earthquakes; a most destructive one occured in 1868. It was stormed and taken by the Chilians in 1880, and afterwards set on fire. About 230 vessels of some 260,000 tons enter this port annually, and about the same number clear it with cargoes. The climate is salubrious. Pop. about 4,000. The dept. of Tacna is now held by Chile (q.v.).

ARICHAT, *â-re-shât':* seaport of Cape Breton Island, province of Nova Scotia, with a harbor for the largest vessels. It is near the Gut of Canso, the most southerly of three channels of communication between the Gulf of St. Lawrence and the Atlantic. The town is largely engaged in fishing, and at the head of its harbor a lead-mine has recently been opened. Pop. abt. 1,000.

ARID, a. *ăr'ĭd* [L. *arĭdus*, dry: F. *aride*]: dry; devoid of moisture. ARIDITY, n. *ă-rĭd'ĭ-tĭ*, or AR'IDNESS, n. dryness; want of moisture.

ARIDAS, *âr'ĭ-dâs* [from some of the Indian languages]: a kind of taffeta from the East Indies woven of fibres from various plants.

ARIÈGE, or ARRIEGE, *â'rē-âzh':* river in the s. of France,

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rises in the dept. of the East Pyrenees, flows through a beautiful vale, and falls into the Garonne near Toulouse.

The dept. of ARIÈGE, along the n. slopes of the Pyrenees, formed a part of the old county of Foix, the territory of Couserans, and the province of Languedoc; bounded n. and w. by Haute Garonne, e. by Aude, s. by the republic of Andorra and the Pyrenees. It contains some of the highest mountain-summits in France, such as Fontargente, 9,164 ft.; Serrère, 9,592 ft.; Montcalm, 10,513 ft.; Estats, 10,611 ft.; Montvalier, 9,120 ft. The dept., nevertheless, has a mild climate. Area 1,880 sq. miles. The inhabitants are engaged chiefly in agriculture, pasturage, iron mines, and the manufacture of woolens, linen, pottery, etc. The three arrondissements are Foix, Pamiers, and St. Girons. Chief towns—Foix, Pamiers, St. Girons. Pop. of A. (1891) 227,491.

ARIES, n. *ăr'ĭ-ēz* [L. a ram, an anc. battering-ram]: the Ram; one of the signs of the zodiac, including the first 30 degrees of the ecliptic measured from the vernal equinox, or that point where the vernal passage of the sun across the equator takes place. The vernal equinox, or, as it is also called, the first point of A., is constantly changing its position among the fixed stars, in consequence of the precession of the equinoxes, moving w. at the rate of 50″·2 annually. It is from this circumstance that the sign A. no longer corresponds with the constellation A., as when, about 2,000 years ago, the ecliptic was divided into 12 equal parts called signs, each named after the group of stars through which it passed. The present sign A. is in the constellation Pisces, about 30° w. of the original sign; and although the sun at the vernal equinox will always be at the first point of A., yet nearly 24,000 years will elapse before that point will again coincide with the beginning of the constellation A.

ARIGHT, ad. *ă-rīt* [AS. *ariht*, on right]: in a proper form; rightly; without mistake.

ARIL, n. *ăr-ĭl'*, or ARILLUS, n. *ăr-ĭl'lŭs* [F. *arille*, an arillus: Sp. *arillo*, a small hoop—from *aro*, a hoop—from L. *arĭdus*, dry]: a peculiar covering of the seed in some plants, formed by an expansion of the *funiculus* (the cord which attaches the ovule to the *placenta*), or of the placenta itself, as in the pulpy A. of the white water-lilies and passion-flowers, and in the hairs of the willow-seed. This expansion takes place after fertilization, and sometimes invests the seed entirely, sometimes only partially. ARILLED, a. *ăr-ĭld'*, or ARILATE, a. *ăr-ĭl'āt*, having an aril. ARILLODE, n. *ăr'ĭl-ōd* [Gr. *eidos*, resemblance]: an investment, somewhat similar to the A., but derived from the neighborhood of the micropyle, as in the mace of the nutmeg, and the brightly colored investment of the seed of the spindle-tree.

ARINOS, *ā-rē'nōs:* river of Brazil, which after a n.w. course of 700 m., enters the Tapajos, itself an affluent of the Amazon; lat. 9° 30′ s., and long. 58° 20′ w.

ARI'ON: a celebrated lute-player, native of Methymna,

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in Lesbos, about B.C. 700: regarded by the ancients as the inventor of the dithyrambic metre. According to a tradition first given by Herodotus, afterwards decorated by the poets, A. was sent by Periander, ruler of Corinth, to Sicily and Italy, and at Tarentum won the prize in a poetical contest. As he returned laden with gifts in a Corinthian ship, the avaricious mariners determined to slay him and seize his wealth; of this the poet-musician was forewarned by Apollo in a dream. He asked for permission to try his skill in music; and after playing on his lute, threw himself from the deck into the sea. Here several dolphins, charmed by his music, had assembled round the vessel. On the back of one of them the musician rode safely to the promontory of Tænarus, where he landed, and journeyed on to Corinth. The sailors, who, arriving afterwards, assured Periander that A. was dead, were confronted with him, when they confessed their guilt, and were crucified. The lute and dolphin were raised among the constellations; and the story became a favorite theme with artists. A. W. Schlegel, in one of his best poems, gives this story of A.

ARIOSTO, *â-re-os'to*, LUDOVICO: one of the greatest of Italian poets: 1474, Sep. 8—1533, June 6; b. Reggio; eldest son of the military governor of that city. He was bred to the law, but abandoned it for poetry. However, at an early period of life, he was compelled to exert himself for the support of a large family, left as a burden on him at the death of his father. His imaginative powers were developed in early life. In 1503, after he had written two comedies, with several lyrical poems in Latin and Italian, he was introduced to the court of the Cardinal Hippolytus d'Este, who employed him in many negotiations. Here, in Ferrara, in about ten years, he produced his great poem *Orlando Furioso*, pub. in that city, in one vol. 4to, in 1516, in forty cantos. After the death of the cardinal, the duke, his brother, invited the poet to his service, and acted to him with great kindness and liberality. In the early part of 1521, a second edition of his poems was published, the *Orlando Furioso* being still in forty cantos. Shortly after he was commissioned by the duke to suppress an insurrection which had broken out in the wild mountain-district of Garfagnana; a task which seems more like a punishment than a mark of honor. A., however, succeeded in this arduous undertaking; and after remaining three years governor of the quarter, he returned to Ferrara, where he lived comfortably, nominally in the service of his patron, but in reality enjoying what he highly prized—an abundant leisure for prosecuting his studies. It was at this time that he composed his comedies, and gave the finishing touch to his *Orlando*. At length, in the latter part of 1532, that poem made its appearance in a third edition, enlarged to its present dimensions of forty-six cantos. He now became seriously ill of a painful internal distemper, of which, after a few months of suffering, he died on the 6th of June, 1533, in his fifty-ninth year, and was buried in the church of San Benedetto, at Ferrara, where a magnificent

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monument indicates the resting-place of his remains. A. is described as a man of noble personal appearance and amiable character. His *Orlando Furioso* is a romantic, imaginative epic, marked by great vivacity, playfulness of fancy, and ingenuity in the linking together of the several episodes. It takes its name and its theme from a chivalrous romantic poem by Boiardo, the *Orlando Innamorato*. That poem treats of the wars between Charlemagne and the Saracens, confounded as they were by tradition with those of Charles Martel, wherein Orlando, or Roland, stood forward as the champion of Christendom. Orlando is the hero of Boiardo's piece, and falls in love with Angelica, a clever and beautiful oriental princess, sent by the Paynim to sow discord among the knights of the Christian armies. The story of this lady, being left unfinished in the *Orlando Innamorato*, is taken up by A., who makes her fall in love herself with an obscure squire Medoro, on which Orlando gets furious, and long continues in a state of insanity. Besides his great work, A. wrote comedies, satires, sonnets, and a number of Latin poems, all more or less marked with the impress of his genius. In 1845, Giamperi, a librarian of Florence, announced that he had discovered at Argenta, near Ferrara, an autograph manuscript by A., containing a second epic, *Rinaldo Ardito*, describing, like the *Orlando*, the battles of Charlemagne and his paladins against the Saracens. The manuscript had been mutilated, and contained in a complete form only the cantos 3, 4, 5, while 2 and 6 were imperfect; and it was stated that the entire poem had consisted of twelve cantos. The work was published under the title *Rinaldo Ardito di L. Ariosto, Frammenti Inediti Pubblicati sul Manuscritto Originale* (Florence, 1846). In genius and style, it has been found by critics not to accord with the *Orlando*. Of the *Orlando* there are many English translations: by Harrington (1607 and 1634); Croker (1755); Huggins (1757); Hoole (1783); and by Stewart Rose (1823). In the last only is there to be found a fair representation of the feeling and spirit of the original. One of A.'s comedies had been rendered into English by Gascogne as early as the year 1566.

ARIOVISTUS, *ā'rĭ-ō-vĭs'tŭs* [probably the latinized form of the German *Heer-fürst*, army-prince]: a German chief in the century before Christ, leader of the Marcomanni and other German tribes, who was requested by the Sequani, a Gallic people, to assist them in a contest against the Ædui. Having gained a victory for the Sequani, A. was so well pleased with their fine country (now Burgundy), that he and his followers determined to abide there. Many other Germans followed him into Gaul, where he soon collected an army of 120,000 men. The Gallic people turned now for help towards the Romans, and Cæsar demanded an interview with A., who proudly replied, that 'he did not see what Cæsar had to do with Gaul.' After another message from Cæsar had been treated in the same scornful manner, the Roman forces under Cæsar advanced and occupied Vesontium (now

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Besançon), the chief city of the Sequani. A furious engagement took place (B.C. 58), in which Roman discipline prevailed over the German forces, which were utterly routed. A., with only a few followers, escaped over the Rhine into his own country. His subsequent history is unknown.

ARISE, v. *ă-rĭz'* [AS. *arisan:* Goth. *reisan:* Icel. *risa*, to arise: Ger. *reisen*, to start]: to get up; to come into view; to ascend. ARI'SING, imp. AROSE, pt. *ă-rōz'*, got up. ARISEN, pp. *ă-rĭzn'*, got up; mounted upwards.—SYN. of 'arise': to mount; ascend; climb; scale; proceed; issue; spring; flow; emanate.

ARISPÉ, *â-ris'pā :* t in Sonora, the extreme n.w. dept. of the Mexican Confederation. It is in the Sierra Madre, the w. range of the Rocky Mountains, on the banks of the Sonora, which is said to lose itself in an inland lake. The surrounding district abounds in the precious metals, as also in cotton, wine, grain, and live stock. Pop. (est.) 7,600.

ARI'STA AND ARIS'TATE: see AWN.

ARISTÆUS, *ăr'ĭs-tē'ŭs* [from a Greek word signifying *the best*]: an ancient divinity whose worship in the earliest times was widely diffused throughout Greece, but whose myth is remarkably obscure. According to the common tradition, he was the son of Apollo and Cyrene, the latter the grand-daughter of Peneius, a river-god of Thessaly. She is said to have given birth to A. on the coasts of Libya, in Africa, whence the region is alleged to have derived its name of Cyrenaica. Hermes placed the child under the protection of the Horæ, the fosterers of cities, culture, and education. According to another tradition, A. was the son of the nymph Melissa, who fed the infant with nectar and ambrosia, and afterwards intrusted his education to Chiron. The great diversities in the legend were probably caused by the fusion into one of separate local divinities, whose functions were similar, and whose histories were, in consequence, carelessly commingled. After A. left Libya, he went to Thebes, in Bœotia, where he was taught by the Muses the arts of healing and prophecy, and where he married Autonoë, the daughter of Cadmus, by whom he had several children. After the unfortunate death of his son Actæon (q.v.), he went to Ceos, where he liberated the inhabitants from the miseries of a destructive drought by erecting an altar to Zeus *Icmæus*—i.e., the rain-maker. He now returned to his native land; but shortly after set out a second time on a voyage of beneficence. He visited the islands of the Ægean Sea, Sicily, Sardinia, and Magna Græcia, leaving everywhere traces of his divine benignity. At last he went to Thrace, where he was initiated into the mysteries of Dionysus; and after a brief residence in the vicinity of Mount Hæmus, he disappeared from the earth.

This myth is one of an extremely pleasing character, from the invariable beneficence which is attributed to A. It is less disfigured by anthropopathic errors than most of the

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myths of Greek divinities. A. was specially worshipped as the protector of vine and olive plantations, and of hunters and herdsmen. He also trained men to keep bee-hives, and averted the burning heats of the sun from the open fields. Later mythology often identified A. with the higher gods Zeus, Apollo, Dionysus.

ARISTARCH, n. *ăr'ĭs-tärk* [from *Aristar'chus* of Alexandria]: a severe critic.

ARISTARCHUS, *ăr'ĭs'tär-kŭs*, OF SAMOS: a celebrated ancient astronomer, of the Alexandrian school, who lived, B.C. 281—264. All his writing have perished, except a short essay on the sizes and distances of the sun and the moon. In this he shows the method of estimating the relative distances of the sun and the moon from the earth, by the angle formed by the two bodies at the observer's eye at that moment when the moon is exactly half-luminous. It will be obvious from a glance at the annexed figure that the three bodies must then form a right-angled triangle, of which the moon is at the right angle. The angle MES then being observed, it is easy to find the ratio between EM and ES. This is quite correct in theory; but the impossibility of determining when the moon is exactly half-illuminated renders the method useless in practice. Besides, in the days of A. there were no instruments for measuring angles with anything like accuracy. A. estimated the angle at E at 83°, and determined EM to be $\frac{1}{18}$ of ES; the truth being that the angle at E differs only by a fraction of a minute from a right angle, and that EN, the distance of the moon from the earth, is about $\frac{1}{400}$ of ES, the distance of the sun. According to some accounts, A. held, with the Pythagorean school, that the earth moves round the sun; but this seems to be a mistake. Vitruvius speaks of A. as the inventor of a kind of concave sun-dial.

ARISTAR'CHUS, of SAMOTHRACE: a grammarian, who lived abt. B.C. 150 in Alexandria, where he founded a school of grammar and criticism, and educated the children of Ptolemy Philopator. His life was devoted chiefly to the elucidation and restoration of the text of the Greek poets, especially of Homer. The form in which we now have the Homeric poems preserved is in a great measure owing to his judgment and industry. The strictness of his critical principles has made his name a general term for a severely just and judicious critic. Being afflicted with an incurable dropsy, he ended his life by voluntary starvation at the age of 72. The fragments of his writings that have been preserved are to be found scattered through the *Scholia* on Homer, first published by Villoison (Venice, 1788).

ARISTATE, a. *ă-rĭs'tāt* [L. *ăris'ta*, a beard of corn]: furnished with beards, like barley and many grasses; awned.

ARISTEAS, *ă-rĭs'tē-ăs:* an entirely fabulous character

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who may be styled 'the Wandering Jew' of popular tradition in ancient Greece. First we find A. teaching Homer; then, some ages afterwards, born at Proconnesus, an island in the Sea of Marmora. It is stated that having visited the Arimaspæ, the gold-watching griffin, and the Hyperboreans, he died on his return home; but, soon afterwards, a traveller asserted that he had been met and accosted by A. Consequently, neighbors searched the house where the body of A. was supposed to be lying, but it could not be found. Seven years afterwards, he appeared as an author, and wrote a poem entitled *Arimaspeia*, in three books, giving accounts of northern and central Asia, which were copied by Herodotus and others. After thus establishing himself as a poet, he vanished again; and after 340 years of mystery reappeared at Metapontum, in the south of Italy, where he advised the people to erect an altar to Apollo, and an altar to 'the everlasting Aristeas,' assuring them that, when Apollo founded their city, he (A.), in the form of a raven, had accompanied the god, and had assisted in the ceremony. In the early controversy of the Christian Church, heathens sometimes quoted this tale of A. as a counterpart to the miracles recorded in the New Testament.

ARISTI'DES, surnamed 'THE JUST': son of Lysimachus, and descended from one of the best families in Athens: d. B.C. 468. He was one of the ten leaders of the Athenians against the Persians at the battle of Marathon (B.C. 490). It had been arranged that each leader (or *strategos*) should hold the supreme command for one day; but A., who saw the folly of this want of unity, induced his companions to give up their claims, and make Miltiades commander-in-chief, which proved the means of winning the battle. In the following year, A. was chief archon, and in this position, as in every other, secured the general respect of the citizens. Some years later, probably because he had opposed the plans of Themistocles, that unscrupulous leader brought about the banishment of A. It is said that when an illiterate citizen, who did not know him personally, requested him to write his own name on the voting shell, he asked the man whether A. had injured him. 'No,' said the voter; 'but I am weary of hearing him always styled "the Just."' A. submitted to the sentence with dignity, praying to the gods, as he left the city, that the Athenians might not have cause to repent of their decision. Only three years later, Xerxes, with an overwhelming force, had invaded Greece. A., hearing that the Greek fleet was surrounded by that of the Persians, hastened from Ægina to apprise Themistocles of the danger, and offer his aid. After taking a prominent part in the battle of Salamis, A. was restored to popular favor, and soon afterwards aided greatly in achieving the victory at Platæa, in which he commanded the Athenians. In B.C. 477, he introduced a change of the constitution, by which all citizens without distinction of rank, were admitted to political offices. As showing the confidence reposed in A., it is related that Themistocles having announced that he had a scheme very

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advantageous for Athens, but which he could not disclose in a public assembly, A. was deputed to consult with Themistocles on the subject. The plan was to secure the naval supremacy of Athens by burning all the vessels of the other Greek states, her allies, then lying in a neighboring harbor. A. reported to the people that nothing could be more advantageous than the plan of Themistocles, but nothing could be more unjust; and the matter was immediately rejected by the people. After a variety of other public services, A. died in old age, and universally respected, so poor that it is said his funeral had to be provided for by the public.—He left a son and two daughters, for whom provision was made by state bounty.

ARISTIPPUS, *ăr'is-tĭp'pŭs:* founder of the Cyrenaic school of philosophy among the Greeks: b. Cyrene, Africa, abt. B.C. 424; son of Aritades, a wealthy gentleman of that city. Having come over to Greece to attend the Olympic games, he heard so much of Socrates, that he was filled with an eager desire to see the sage, and hurried to Athens, where he became one of his pupils. He remained with Socrates up nearly to the last moments of the great teacher, though he does not at any period seem to have followed his doctrines or his practice. We know that subsequently he was the object of strong dislike, both to Plato and to Antisthenes the Stoic. He passed a considerable part of his life in Syracuse, at the court of Dionysius, the tyrant, where he acquired the reputation of a philosophic voluptuary. That his manners must have been at once extremely graceful and accommodating, is clear from the saying of his opponent, Plato, who declared that 'A. was the only man he knew who could wear with equal grace both fine clothes and rags.' Diogenes Laertius records a number of his *dicta*, some of which take the form of *bons-mots* and indicate a sharp, cutting, lively, and self-complacent nature. A. lived also at Corinth, in intimacy with the famous courtesan Laïs, but towards the close of his life he is supposed to have retired to Cyrene. His daughter Arete seems to have been a person of superior abilities, inasmuch as her father imparted his leading doctrines to her, and she to her son, A. the Younger (hence called *Metrodidaktos*, 'taught by the mother'), by whom they are supposed to have been systematized. A. in all probability published nothing during his life. He prided himself more upon spending his days in what he conceived to be a philosophical manner, than in elaborating a philosophical system for the benefit of the race.

The Cyrenaic school, all the teachers of which were probably imbued with the spirit of A., and merely carried out his doctrines to their legitimate results, professed a great contempt for speculative philosophy, and for physical and mathematical knowledge. They confined their investigations to morals, and formed an ethical system completely in harmony with the gay, self-possessed, worldly, and skeptical character of their master. The chief points of the Cyrenaic system were: 1. That all human sensations are either pleasurable or painful, and that pleasure and pain are the only criterions

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of good and bad. 2. That pleasure consists in a gentle, and pain in a violent, motion of the soul. 3. That happiness is simply the result of a continuous series of pleasurable sensations. 4. That actions are in themselves morally indifferent, and that men are concerned only with their results. Wieland in his historico-philosophical romance, *Aristipp und einige seiner Zeitgenossen* (A. and Some of his Contemporaries), presents us with a charming picture of the life and opinions of the great philosophic sensualist, who stood out in strong relief against the gloom and austerity of Antisthenes and the Cynical school. The doctrine that makes pleasure the chief good is often called *Hedonism*.

ARISTOBULUS, *ă-rĭs'tō-bū'lŭs:* an Alexandrian Jew who lived under Ptolemæus Philometer abt. B.C. 175, and was considered by the early Fathers as the founder of the Jewish philosophy in Alexandria. He was long considered the author of the *Exegetical Commentaries on the Books of Moses* which went under his name, but it is now admitted that the work in question was the composition of a later period. Only fragments of it remain. It was intended to show that the oldest Greek writers borrowed from the Hebrew Scriptures; and to support this theory, numerous quotations were professedly taken from Linus, Musæus, Orpheus, etc., of which the Christian apologists made abundant use. These, however, have long been considered forgeries, inasmuch as they do not exhibit a trace of the antique Greek spirit, but make the writers speak in the tone and style of the Old Testament (see Valckenær's treatise). For the Hasmonean or Maccabee prince A., see JEWS.

ARISTOCRACY, n. *ăr'ĭs-tŏk'rŭ-sĭ* [Gr. *aris'tokratĭ'a*, the rule of the best born—from *aristos*, best; *kratos*, rule, strength]: government by nobles; the nobility or chief persons of a country. ARISTOCRAT, n. *ăr-ĭs'tō-krăt* or *ăr'ĭs-tō-krăt'*, one who favors an aristocracy; one of the nobles; *familiarly*, a haughty person. ARISTOCRATIC, a. *ăr'ĭs-tō-krăt'ĭk*, or AR'ISTOCRAT'ICAL, a. *-ĭ-kăl*, belonging to the aristocracy; *familiarly*, very dignified; haughty. AR'ISTOCRAT'ICALLY, ad. *-lĭ*. AR'ISTOCRAT'ICALNESS, n. the quality of being aristocratical. ARISTOCRATISM, n. *ăr'ĭs-tō-krăt'ĭzm*, the principles or habits of aristocrats. AR'ISTOCRATIZE', v. *-krăt-īz'*, to raise from a lower to a higher level in the social scale, as by education, investing with the franchise, etc.

ARISTOC'RACY [Gr. *aristocratia*, from *aristos*, best, and *kratos*, power]: means etymologically the power or government of the best, noblest, or most worthy; and in the sense which it originally bore, A. had reference not to a social class, but to a form of government in which the sovereignty was placed in the hands of a minority of the citizens of the state, exclusive altogether of the slave population, which generally existed in antiquity. It is in this sense also that we use it when we speak of the Italian states of the middle ages as aristocracies. In order to constitute an A., it was further necessary that the minority which composed it should consist of the highest class, in point not of wealth alone, but of

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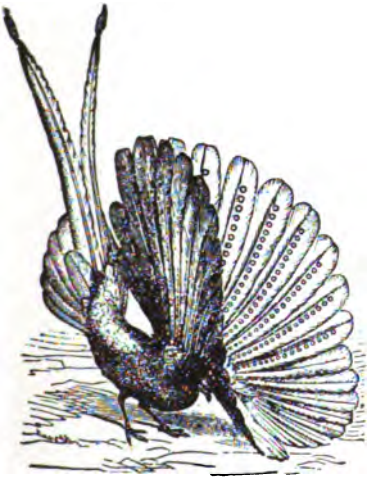

Argus Pheasant. (From Darwin.)

Ark, containing the Rolls of the Law.—Great Synagogue, Aldgate, London.

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birth and culture; the government of a minority in numbers simply, being known by the more odious name of an *oligarchy*. Were the whole government of England intrusted to the house of lords, even though that body were to become vastly more numerous than it is, so long as it did not include half of the adult males, and were not elective, but hereditary, the country would be ruled by an A., and its rulers would be aristocrats in the antique sense of the term. In this, its political sense, the term A. has never been acclimatized in England, because the thing which it signifies has always been unknown. The territorial nobility, though possessing great influence in the government of the country, has, at every stage of its career, been controlled either by the crown from above or the commons from below; and thus it is that, though more important in social influence than in any other country, the English A. has never assumed the form of a ruling class. When used with reference to English society, the term A. has two significations—a narrower and a wider one. According to the first, it is nearly synonymous with *nobility* (see that title and its relative subdivisions). According to the second, it is synonymous with *gentry*, and includes the whole body of the people, titled and untitled, above a certain very indefinite social line. Perhaps the nearest approximation which we shall make to a definition of A. in this, its proper English sense, will be by adopting that which Aristotle has given, not of *aristocratia*, but of *eugeneia*, or good birth. 'Good birth,' he says, 'is ancient (long inherited) wealth and virtue.' (*Politic.* lib. iv. c. 7.) The question as to the extent to which either of these qualities is requisite to constitute a claim to admission into the ranks of the A., is one to which probably not two persons, either within or without the pale, would return the same answer; but that the absence of either would be a ground of exclusion is a point on which there will be little difference of opinion. In England, no amount of mere wealth will, in general, confer it either on a tradesman or his immediate descendants (see GENTLEMAN); and scarcely any deeds, however noble, will give it to him who is not the possessor of inherited fortune. Neither Burns the gauger, nor Shaw the life-guardsman, has ever been regarded as an aristocrat, though nobody denies that the one was a poet, and the other a hero. But when the claim to recognition as an aristocrat has been inherited, it will scarcely be lost by the individual himself, however adverse may be his worldly circumstances, or however ignoble his conduct; and it is not difficult to imagine an elevation of moral tone which would confer it even on a beggar. In the United States, the claim to A. is scarcely asserted under that term; and the term itself is scarcely used except with some suggestion of opprobrium; though the thing indicated may be claimed or sought for under another name.

ARISTOGEI'TON: see HARMODIUS and ARISTOGEITON.

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ARISTOLOCHIA, *ă-rĭs'tŏ-lō'kĭ-ă:* genus of plants of the natural order *Aristolochiaceæ* or *Asarineæ*. This order, which is dicotyledonous or exogenous, consists of herbaceous plants or shrubs, often climbing shrubs, and contains upwards of 130 known species, chiefly natives of warm climates, and particularly abundant in the tropical regions of S. America. The leaves are alternate, simple, stalked, often with a stipule; the flowers axillary, solitary, hermaphrodite, of a dull color; the perianth at its base adhering to the ovary, tubular, sometimes regular, but generally very irregular; the stamens 6–12, epigynous (or inserted upon the ovary), distinct, or adhering to the style; the ovary is generally six-celled, with numerous ovules; the style simple, the stigmas radiating, as numerous as the cells of the ovary; the fruit dry or succulent; the seeds with a very minute embryo at the base of fleshy albumen.—The genus A. is distinguished by a tubular oblique perianth, generally inflated at the base, the mouth dilated on one side, and by stamens adherent to the style, so that it is included in the Linnæan class *Gynandria*. The species are mostly shrubby, and natives of tropical countries, some of them climbing to the summits of the loftiest trees. Several are found in the south of Europe; one only, the common BIRTHWORT (*A. Clematitis*), occurs upon the European continent as far n. as about lat. 50°, and is a doubtful native of England. It is a perennial plant, with erect, naked, striated stem, heart-shaped dark-green leaves on long stalks, the flowers stalked, and growing to the number of sometimes seven together from the axils of the leaves, the tube of the perianth about an inch long, and of a dirty yellow color. It grows chiefly in vineyards, hedges, about the borders of fields, among rubbish, and in waste places. It has a long branching root, with an unpleasant taste and smell, which, with the roots of *A. rotunda* and *A. longa*, two herbaceous species, natives of the south of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the English name. These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *A. Indica* is used in the same way by the Hindoos.—*A. serpentaria*, VIRGINIAN SNAKEROOT, is a native of most parts of the United States, growing in woods. It has a flexuous stem, 8–10 inches high, bearing heart-shaped very acute leaves. The flowers are on stalks, which rise

Aristolochia Clematitis.

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from the root; the orifice of the perianth is triangular. The root has a penetrating resinous smell, and a pungent, bitter taste. It has long been a fancied remedy for the bite of the rattlesnake. It possesses stimulant and tonic properties. It is an article of export from the United States to Europe, and bears a high price, being highly esteemed as a medicine in certain kinds of fever.—Its reputation as a cure for serpent-bites is shared by other species, particularly *A. anguicida* and *A. guaco* (the Guaco of Colombia), natives of the warmer parts of America. The juice has certainly the power of stupefying, and even of killing, serpents; and it is said that a number of species are used by Egyptian jugglers, in order to their handling serpents with impunity. —Several South American species seem also to possess medicinal properties analogous to those of the Virginian snakeroot.—*A. Sipho*, a climbing shrub, of 15–20 ft. in height, a native of the southern parts of the Alleghany Mountains, is frequently planted in the United States, in Britain, and on the continent of Europe, to form shady bowers. It has very large heart-shaped leaves (a foot in breadth) of a beautiful green. The flowers hang singly, or in pairs, on long stalks; the tube of the perianth is crooked in its upper part, inflated at the base, and veined with reddish-brown veins, having a sort of resemblance to

Aristolochia Serpentaria:
***a*, a flower; *b*, a flower not open, showing the parts of fructification *c*; *d*, the stamens; *e*, the stigmas.**

the bowl of a tobacco-pipe, for which reason the shrub is sometimes called Pipe-shrub, Pipe-vine, or Dutchman's Pipe.—The tropical species are distinguished for their beauty and the peculiar forms of their flowers. Some of them are much prized ornaments of our hot-houses. The genus ASARUM also belongs to the order *Aristolochiaceæ*.

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ARISTO'PHANES, *ăr'ĭs-tŏf'a-nēz:* the only writer of the old Greek comedy of whom we possess any entire works: b. Athens, abt B.C. 444; son of one Philippus. We know very little of his history. Plato, in his *Symposium*, relates that he was fond of pleasure—a statement which it is easy to credit when we consider the tendencies of his profession in all ages. It seems equally clear, however, from the vigorous and consistent expression of his convictions in his various works, and from the fearless manner in which he assails the political vices of his day, that he was possessed of an honest and independent spirit. He appeared as a comic writer in the fourth year of the Peloponnesian war (B.C. 427). The piece which he produced was entitled *Daitaleis* (the Banqueters), and received the second prize. It ridiculed the follies of extravagance, and like all his subsequent works, was pervaded by a contempt of modern life, and an admiration of the sentiments and manners of the earlier generations. Next year, he wrote the *Babylonians*, in which he satirized Cleon, the so-called demagogue, so sharply, that the latter endeavored to deprive him of the rights of citizenship, by insinuating that he was not a real Athenian. This in all probability gave rise to the various traditions of A. having been born in Rhodes, Egypt, etc. Fragments of these plays remain. In 425, his *Acharnians* obtained the first prize. It was written to expose the madness of the war then waging between Athens and Sparta, and exhibits the feelings of the 'peace-party' in the former city. It is still extant. In 424, appeared *Hippeis*, the *Knights* or *Horsemen*. It was the first which the poet produced in his own name, and evinces the singular boldness of the author. It is levelled against Cleon, and presents us with a striking picture both of a vulgar and insolent charlatan, and of the fickle, cunning, credulous, and rather stupid mob over whom he precariously tyrannizes. It is related of this piece that, when no actor would undertake to play the part of the powerful Cleon, A. himself impersonated the demagogue. Unfortunately for the character of Cleon as well as that of the Athenian democracy, these caricatures and misrepresentations of A. have been received as historical pictures. How far they are from the truth has been clearly shown by Grote in his *History of Greece*. See CLEON. In 423, A. produced the *Clouds*, which and the *Knights* are the two most famous of his comedies. They exhibit in overflowing richness that fancy, wit, humor, satire, and shrewd insight which characterize this greatest of all Greek comic writers. The *Clouds*, however, displays at the same time the weaknesses and limitations of A.'s mind. Its aim was to deride the pretensions of the new sophistical school, and to point out its pernicious tendencies. So far well. But A., who was no philosopher, demonstrates his own incapacity to appreciate the highest range of thought and character, by selecting no less a person than Socrates as the most perfect representative of a sophist. A., who was both religiously and politically conservative, had apparently no clearer conception of abstract truth than is in-

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volved in reverence for the sanctities of the past, the old gods, old traditions, old manners, and old sentiments. He had an instinctive hatred of innovations, and considered all equally pernicious. As he had represented Cleon the reformer as a vulgar innovator and demagogue, ruled by the lowest considerations, he makes the innovating views of Socrates also proceed from corrupt motives, veiled perhaps with more craft. Alcibiades is caricatured in this brilliant comedy as a wildly extravagant youth, whose career of ruin is accelerated by the insidious instructions of Socrates, and a hint is thrown out towards the end of the piece, which unfortunately proved to be the 'shadow' of a 'coming event.' A. represents the father of Alcibiades as about to burn the philosopher and his whole *phrontisterion* (subtlety-shop); and there can be little doubt that this dramatic vilification of the purest of heathen moralists led to that persecution which, twenty years later, culminated in his condemnation and death. In 422, appeared the *Wasps*, still extant, in which the popular courts of justice are attacked; and three years later, in his *Peace*, he returns to the subject of the Peloponnesian war, which is ridiculed with great cleverness. In 414, he produced two comedies, *Amphiaraus* and the *Birds*, both of which caricature, in the liveliest manner, the Sicilian expedition, then being meditated, but which proved so utter a failure. The *Lysistrata* belongs to the year 411, and exhibits a civil war of the sexes, as the monstrous issue of that in the Peloponnesus. In his *Plutus* and *Ecclesiazusæ*, which appeared in 408 and 392, he assailed the new passion for Doric manners and institutions, and ventured to ridicule Plato, in that, however, in which the philosopher is weakest—namely, his political theory. Euripides, also, as the sophist among poets, is severely handled in the *Frogs*.

A. wrote fifty-four comedies, of which only eleven are extant. He is acknowledged to stand far above all his contemporaries or successors of the middle and new comedy in wealth of fancy and beauty of language. His choruses sometimes exhibit the purest spirit of poetry; and Plato himself says that the soul of A. was a temple for the Graces. The ingenuity which he shows in the mechanical artifices of verse is not less wonderful. Frogs are made to croak choruses, pigs to grunt through a series of iambics, and words are coined of amazing length—the *Ecclesiazusæ* closes with one composed of 170 letters. It only remains to be added, that the personalities in which A. indulged descend at times into coarseness and indecency, and that even the gods whom he undertook to defend are treated with levity, and placed in the most ludicrous lights.

ARISTOPHANIC, a. *ăr'ĭs-tō-făn'ĭk* [from *Aristoph'anĕs* (q.v.)]: shrewd; witty.

ARISTOTE'LIA: see MAQUI.

ARISTOTELIAN, a. *ăr'ĭs-tō-tēl'ĭ-ăn*, or ARISTOTEL'IC, a. [from *Aristotle* (q.v.)]: pertaining to Aristotle or his philosophy: N. a follower of Aristotle's philosophy. ARISTOTE'LIANISM, n. the Peripatetic system of philosophy founded by Aristotle.

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ARISTOTLE, *ăr'is-tot-l:* B.C. 384–322; b. at the Grecian colonial town of Stageira, on the w. side of the Strymonic Gulf (now the Gulf of Contessa, in Turkey in Europe). He belonged to a family in which the practice of physic was hereditary. His father, Nikomachus, was the friend and physician of Amyntas II., king of Macedonia, father of Philip, and grandfather of Alexander the Great. A. lost both parents while he was quite young, and was brought up under the care of Proxenus, a citizen of Atarneus, in Asia Minor, who was then settled at Stageira. It is to be conjectured that his education, such as it was, would take the direction of preparing him for the family profession, and that whatever knowledge and power of manipulation attached to the practice of physic at that time would be among his early acquisitions. In after-life, he occupied himself largely in the dissecting of animals, and was acquainted with all the facts that had been derived from this source by others before him. It seems probable, however, that he early abandoned the intention of following physic as a profession, and aspired to that cultivation of universal knowledge for its own sake, in which he attained a distinction without parallel in the history of the human race.

In his 18th year (B.C. 367) he left Stageira for Athens, then the intellectual centre of Greece and of the civilized world. Plato, on whom he doubtless had his eye as his chief instructor, was then absent at Syracuse in that extraordinary episode of his life, connecting him as political adviser with the two successive Syracusan despots—Dionysius the Elder, and Dionysius the Younger—and with Dion. A., therefore, pursued his studies by books, and by the help of any other masters he could find, during the first three years of his stay. On the return of Plato, he became his pupil, and soon made his master aware of the remarkable penetration and reach of his intellect. The expressions said to have been used by Plato imply as much; for we are told that he spoke of A. as the 'Intellect of the School.' Unfortunately, there is a total absence of particulars or precise information as to the early studies of the rising philosopher. He remained at Athens twenty years, during which the only facts recorded, in addition to his studying with Plato, are, that he set up a class of rhetoric, and that, in so doing, he became the rival of the celebrated orator and rhetorical teacher, Isocrates, whom he appears to have attacked with great severity. It was in the schools of rhetoric that the young men of Athens got the principal part of their education for public life. They learned the art of speaking before the Dikasteries, or courts of law, and the public assembly, with efficiency and elegance; and incidentally acquired the notions of law and public policy that regulated the management of affairs at the time. We can easily suppose that A. would look with contempt upon the shallowness—in all that regarded thought or subject matter—of the common rhetorical teaching, of which, doubtless, the prevailing excellence would lie in the form of the address, being artistic rather than profound or erudite. One of the disciples of Isocrates, defending his master against A., wrote a treatise

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wherein allusion is made to a work (now lost) on proverbs, the first recorded publication of the philosopher.

The death of Plato (B.C. 347) was the occasion of A.'s departure from Athens. It was not extraordinary or unreasonable that A. should hope to succeed his master as the chief of his school, named the Academy. We now know that no other man then existing had an equal title to that pre-eminence. Plato, however, left his nephew Speusippus as his successor. We may suppose the disappointment thus arising to have been the principal reason for A.'s determination to stay no longer in Athens; but there are other reasons also that may be assigned, arising out of his relations with the Macedonian royal family at a time when the Athenians and Philip had come into open enmity.

Whatever may be the explanation, he went in his 37th year, after a stay of nearly twenty years in Athens, to the Mysian town of Atarneus, in Asia Minor, opposite to the island of Lesbos. Here he lived with Hermeias, the chief of the town, a man of singular energy and ability, who had conquered his dominion for himself from the Persians, at that time masters of nearly all Asia Minor. A. had taught him rhetoric at Athens, and he became in return the attached friend and admirer of his teacher. For three years the two lived together in the stronghold of Atarneus; but by treachery and false promises, the Rhodian Mentor, an officer in the Persian service, got possession of the person of Hermeias, put him to death, and became master of all the places held by him. A. accordingly fled, and took refuge in Mitylene, the chief city of the neighboring island of Lesbos. He also took with him Pythias, the sister of Hermeias, and made her his wife. In a noble ode, he has commemorated the merits of his friend thus lost to him through the treachery of a Greek renegade. His wife, Pythias, died a few years afterwards in Macedonia, leaving him a daughter of the same name. His son, Nikomachus, to whom he dedicated his chief work on ethics—called, in consequence, the *Nikomachean Ethics*—was born to him at a later period of his life by a concubine.

After two years' stay at Mitylene, he was invited (B.C. 342, age 42) by Philip to Macedonia to educate his son Alexander, then in his 14th year. What course of study Alexander was made to go through, we cannot state. He enjoyed the teaching of A. for at least three years, and contracted a strong attachment to his preceptor, which events afterwards converted into bitter enmity. The two parted finally when Alexander commenced his expedition into Asia (B.C. 334), and A. came from Macedonia to Athens, having recommended to the future conqueror, as a companion in his campaigns, the philosopher Callisthenes, whom he educated with Alexander. Now at the age of 50, he entered on the final epoch of his life; he opened a school called the 'Lyceum,' from its proximity to the temple of Apollo Lyceius. From his practice of walking up and down in the garden during his lectures, arose the other name of his school and sect, the *Peripatetic*. It would appear to have been his habit to give a morning lecture to select pupils on

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the more abstruse subjects, and one in the evening of a more popular kind to a general audience. He may now be supposed to have composed his principal writings; but unfortunately, there is nothing known of the dates of any of them. This crowning period of his life lasted twelve years. After the death of Alexander, the anti-Macedonian party at Athens obtained ascendency, and among other consequences, an accusation was prepared against A., the pretext being impiety. With the fate of Socrates before his eyes he chose a timely escape, and in the beginning of B.C. 322 took refuge at Chalcis in Eubœa, where in the autumn he died, aged 62. He had long been afflicted with indigestion, and ultimately sank under this malady.

The philosophy of A. differed from that of Plato on many points, especially in the fundamental doctrine termed the Theory of Ideas. The Platonic 'ideas' or 'forms' were conceived as real existences, imparting all that is common to the particular facts or realities, instead of being derived from them by an operation of the mind. Thus, the actual circles of nature derive their mathematical properties from the pre-existing 'idea,' or circle in the abstract; the actual men owe their sameness to the ideal man. A. was opposed to this doctrine throughout, although he always speaks of its author with respect, and sometimes with affection. The whole method of A. was in marked contrast to the Platonic handling of philosophical subjects: he was a most assiduous observer and collector of facts, from which he drew inductions with more or less accuracy. Plato, on the other hand, valued facts merely in criticising the views that he was bent upon demolishing, and not as a means of establishing sound theories.

The writings of A. may be said to have embraced the whole circle of the knowledge of his time. Many of them are lost; those that remain refer principally to the following departments.

Astronomy, Mechanics, Physics, were treated of by him at some length; but here his failure was complete, if we look at his writings from the point of view now acquired. He was the victim of capricious fancies, based upon doctrines common among his contemporaries, accepted by him as principles of reasoning, and conducting him to the most unsound conclusions. His theory of the rotation of the sphere, the necessary perfection of circular motion, of the impossibility of a vacuum, and the like, did more to confuse than to explain the phenomena of nature. Nor can it be said that the time was not ripe for putting these subjects on a rational basis; for he was very shortly followed by a series of men, who both observed and reasoned soundly respecting them, and laid the foundation of their great subsequent progress—namely, Euclid, Apollonius, Archimedes, Eratosthenes, and Hipparchus.

The thirteen books called Metaphysics contain much profound thought, but are obscure and defectively arranged; indeed, neither the actual arrangement of the books, nor the title which they bear, can be ascribed to A. himself. The subject to which they are devoted is Ontology—the science of *Ens, quatenus Ens*—which he terms *Philosophia Prima*,

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and sometimes Theology. He distinguishes three branches of theoretical philosophy. 1. Physics—the study of sensible material particular things, each of which differs from every other, and all of which have in themselves the principle of change or motion. 2. Mathematics—that of geometrical and numerical entities, known by general definitions, susceptible neither of change nor of movement, capable of being considered and reasoned upon apart from matter, but not capable of existing apart from matter. 3. The First or Highest Philosophy—which studies the essences of things eternal, unchangeable, and apart from all that change, movement, and differentiation which material embodiment involves.

The Metaphysics, or First Philosophy, does in fact deal with the extreme abstractions or generalities of all sciences. It is a collection, partly of doubts and difficulties, partly of attempted solutions, upon these last refinements of the human mind. It includes many valuable comments on the philosophy of Plato and others anterior to or contemporary with A. The general terms and subtle distinctions which this treatise first brought to view were highly prized throughout the philosophy of the middle ages.

He appears in a very different light in his great work on Animals. He has here amassed a stock of genuine observations, and also introduced a method of classification which continues to this day as the most approved groundwork of zoological classification. In this work we see, perhaps, in the most advantageous light, the two great qualities of his mind, rarely coupled in the same individual—the aptitude for observation, and logical method. The excellence shown in his various writings generally depends upon one or other of these qualities.

His Organon or Logic is his complete development of formal reasoning, and is the basis and nearly the whole substance of syllogistic or scholastic logic. This science he almost entirely created. Mr. Grote observes (*History of Greece*, part ii. chap. lxviii.) that 'what was begun by Socrates, and improved by Plato, was embodied as a part of a comprehensive system of formal logic by the genius of A.; a system which was not only of extraordinary value in reference to the processes and controversies of its time, but which also, having become insensibly worked into the minds of instructed men, has contributed much to form what is correct in the habits of modern thinking. Though it has now been enlarged and recast by some modern authors (especially by Mr. John Stuart Mill in his admirable *System of Logic*) into a structure commensurate with the vast increase of knowledge and extension of positive method belonging to the present day—we must recollect that the distance between the best modern logic and that of A. is hardly so great as that between A. and those who preceded him by a century—Empedocles, Anaxagoras, and the Pythagoreans; and that the movement in advance of these latter commences with Socrates.'

A considerable portion of his writings relate to the Human Mind and Body. In one of these, a short treatise on Memory and Recollection, he gave the first statement of the laws of Association of Ideas.

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His treatises on Rhetoric and Poetics were the earliest development of a Philosophy of Criticism, and still continue to be studied. The same remark is applicable to his elaborate disquisitions on Ethics.

Perhaps one of his greatest works is his Politics, based upon a collection made by himself of 158 different constitutions of states; the collection itself being unhappily lost. Here is seen the spirit of the inductive observer, which indeed is no less apparent in the works mentioned in the last paragraph. It is, however, a singular fact, that he gives no evidence of having read the historian Thucydides; and his only reference to Herodotus is on a point of natural history. Yet the narratives and descriptions contained in the works of both these writers are probably of as much value, and as much in point, in a Political Philosophy, as the very best observations made by himself.

The great current distinctions of Matter and Form, Substance and Quality, Actuality and Potentiality, are due to A. See Grote's *Aristotle*, 1872.

ARISTOXENUS, *ăr'ĭs-tŏks'ē-nŭs*, of Tarentum: pupil of Aristotle; one of the oldest writers upon music, lived abt. B.C. 330. He was extraordinarily active and versatile in literary studies, and is said to have composed upwards of 450 treatises on music, history, and philosophy. On the death of Aristotle, he fully expected to be appointed his successor, and is said to have been deeply mortified when Theophrastus was preferred; but this statement is discredited by many. He founded a school of musicians, who were called after him Aristoxeneans, and whose distinguishing characteristic was that they judged of the notes in the diatonic scale exclusively by the ear, while the Pythagoreans determined these mathematically. Except his *Elements of Harmony*, in three books, which we still possess, only a few fragments of his writings survive in later authors.

ARITHMETIC, n. *ă-rĭth'mĕ-tĭk* [Gr. *arithmēt'ikē:* L. *arithmēt'ica*, arithmetic—from Gr. *arĭth'mos*, number: F. *arithmétique*]: the science of numbers; the art of counting or computing. ARITHMETICAL, a. *ăr'ĭth-mĕt'ĭ-kăl*, pertaining to arithmetic. AR'ITHMET'ICALLY, ad. *-kăl-ĭ*. ARITHMETICIAN, n. *ă-rĭth'mĕ-tĭsh'ăn*, one skilled in arithmetic. ARITHMANCY, n. *ăr'ĭth măn'sĭ* [Gr. *manteĭ'a*, divination] divination by numbers. AR'ITHMOM'ETER, n. *-ĕ-tĕr* [Gr. *metron*, a measure]: an abacus.

ARITH'METIC: the science that treats of numbers. It is sometimes divided into theoretical and practical; the former investigating the properties of numbers and their combinations, the latter applying the principles so established, in the form of rules, to actual calculations. Some restrict the term A. to this art of reckoning, assigning the investigation of the principles to analysis.

Among the ancient Greeks and Romans, A. made little progress, owing to their clumsy modes of notation. Few of their writings on the subject have come down to us; the most important are those of Euclid (7–10 B. of the *Elements*), Archimedes, Diophantus, and Nicomachus. After the introduction of the decimal system and the

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Arabic or Hindu numerals (see NUMERALS), about the 11th c., A. began to assume a new form; but it was not till the 16th c. that the Double Rule of Three, or Compound Proportion, was discovered, and decimal fractions were introduced. The invention of Logarithms in the 17th c. is the last great step in advance that the art has made. Passing over the elementary operations of Addition, etc., see the chief titles, such as FRACTIONS: DECIMALS: PROPORTION: LOGARITHMS: etc.

ARITHMET'ICAL COMPLEMENT: that which a number wants to make it reach the next highest decimal denomination. Thus the A. C. of 4 is 6, for $4 + 6 = 10$, and that of 642 is 358, because $642 + 358 = 1{,}000$. The A. C. of a logarithm is what it wants to make it reach 10.

ARITHMET'ICAL MEAN: that number that lies equally distant between two others: thus, the A. M. between 11 and 17 is 14, which is found by taking half their sum.

ARITHMET'ICAL PROGRESSION: a series of numbers that increase or diminish by a common difference, as 7, 10, 13, 16, 19, 22; or 12, 10½, 9, 7½, 6. To find the sum of such a series, multiply the sum of the first and last terms by half the number of terms. The series of natural numbers, 1, 2, 3, 4, etc., form an A. P., of which the difference is 1.

ARITHMET'ICAL PROPORTION: the relation existing between four numbers, of which the first is as much greater or less than the second, as the third is than the fourth; the equality of two differences or arithmetical ratios. In such cases the sum of the extremes is equal to that of the means. Thus 6 and 4, 21 and 19, are in arithmetical proportion; for 4 differs from 6 by 2, as does 19 from 21; the sum of the extremes, $6 + 19 = 25$, is consequently equal to that of the means, $4 + 21 = 25$. It is not the same as the 'Rule of Three,' in which the members are in geometrical proportion. ARITHMETICAL PROPORTIONALS, numbers so related to each other (opposed to *geometric proportionals*).

ARITHMET'ICAL RATIO: the difference between any two numbers constituting part of a series in arithmetical progression.

ARITHMET'ICAL RELATION: comparison together of numbers in an arithmetical progression with the view of ascertaining how much they differ from each other.

ARITHMET'ICAL SIGNS: arbitrary marks or symbols used to denote the operations to be performed on numbers, or the relations existing between them; e. g., $7 + 5$ indicates that 7 and 5 are to be *added* together; $7 - 5$, that 5 is to be *subtracted* from 7; 7^5 that 7 is to be raised to the fifth *power;* $7 + 5 = 15 - 3$, that when 7 and 5 are added together, the result is *equal* to the difference between 15 and 3. The sign $\times$ in 8×4 means that 8 is to be multiplied by 4; the sign $\div$ in $8 \div 4$ means that 8 is to be divided by 4. Mostly the same signs are used in Algebra also.

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ARIUS: *a-ri'us*, or *ā'ri-ŭs:* the celebrated founder of Arianism; b. Libya; and as is supposed shortly after the middle of the 3d c. About 306, Alexandria was thrown into confusion by the violence of its religious disputes, and in these A. was largely active. At first, he took part with Meletius, Bishop of Lycopolis, in Upper Egypt, a man who was strenuously opposed to certain notions of discipline entertained by Peter, Bishop of Alexandria; but afterwards he become reconciled to the latter, who made A. a deacon. The reconciliation, however, was brief. A. once more took the part of Meletius, and was excommunicated by Peter in consequence; but the latter dying soon after, Achillas, his successor, restored A. to his office, and even advanced him to the dignity of presbyter, 313. His new function required that he should interpret the Scriptures, and as he possessed an abundance of natural gifts, united with great learning, his preaching became popular, and his peculiarities of opinion were vehemently embraced. The first time, however, that A. was brought into collision on a point of doctrine with his ecclesiastical superiors was in 318. Alexander, Bishop of Alexandria, successor of Achillas, having in a public assembly of clergy, while speaking of the Trinity, said that it contained one single essence, or indivisible unity of substance, A. alleged that such a conception was impossible to the human mind, and accused Alexander of Sabellianism—i. e., of destroying the distinction of persons. The dispute grew hot, and a conference which was held to settle it only embittered the disputants. In maintaining his ground, A. went beyond his first statement of the absolute distinctness of person between the Father and the Son; he maintained that the Son was not co-equal or co-eternal with the Father, but only the first and highest of all finite beings, created out of nothing by an act of God's free will, and that he ought not to be ranked with the Father.

A. was successful in securing the adherence of large numbers both of the clergy and laity in Egypt, Syria, and Asia Minor. In 321, a synod of bishops was held at Alexandria. These deposed and excommunicated A., and active measures were taken to let this decision be known over all the Christian churches; Alexander himself wrote numerous letters (two of which are still extant), exhorting the bishops not to receive the 'heretic.' In consequence of these violent steps, the breach was widened. To escape persecution, A. retired to Palestine, where he wrote a letter to his friend Eusebius, who was Bishop of Nicomedeia, a city of Bithynia, and not far from Constantinople. Eusebius, one of the most influential Christians of his time, warmly sympathized with him; wrote in his behalf to Paulinus, Bishop of Tyre, and others; absolved him from the Alexandrian synod's excommunication; and in 323 convened another synod in Bithynia, which pronounced favorably on A. He even enlisted Constantine on the side of the latter, to this extent at least, that the half-pagan emperor addressed ad

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monitions to both Alexander and A., assuring them that the point in dispute was a trifling one, and ought not to provoke a serious quarrel. While A. was residing at Nicomedeia, he wrote a theological work in verse and prose, called *Thaleia*, some fragments of which remain, and indicate an earnest and philosophic mind, but contain expressions which could not but pain a believer in the proper divinity of Christ. The *Thaleia* is said to have been sung by the Arian neophytes, who thus kindled the passions of their adversaries, and increased the virulence of the contest. The comedians, who were pagans, took advantage of the occasion to ridicule the Christian religion in the theatres. The officers of the emperor in several cities wished to repress this profane temerity, but the interference only created greater confusion.

It now became impossible for the emperor to remain neutral or indifferent, with safety to himself or to the tranquillity of the empire. Hosius, Bishop of Corduba, whom he had appointed mediator betwixt Alexander and A., took part with the former, and reported unfavorably of A. The result was, that Constantine, in order, as he thought, to effect a final settlement of the question, convoked the memorable Council of Nicæa (Nice, q.v.), in Bithynia, 325. Three hundred and eighteen bishops from almost all the Christian world, especially from the East, were present, besides numbers of priests, deacons, and acolytes. A. boldly expounded and defended his opinions. He declared in the most unambiguous manner that the Son of God was created out of nothing; that he had not always existed; that he was not immutable or impeccable; that it was through his free-will he remained good and holy; that if he had chosen, he could as easily have sinned as not; in a word, that he was a mere creature and work of the Deity. He further affirmed that the Son of God was not of the same substance, with the Father; that he was not the 'Word' or 'Wisdom,' properly speaking; and that the Scriptures only attribute these names to him as they do to other created intelligences. These propositions were listened to with great calmness by the bishops, but the inferior clergy, or at least a majority of them, manifested the most violent opposition. The document containing his confession of faith was torn to pieces before his face. Arguments, however, of a more rational kind were also employed. Alexander was ably seconded by the young deacon, Athanasius, the equal of A. in eloquence, and in the power of his logic. It was principally by the reasonings of Athanasius that the council was persuaded to define, in the most precise manner, as the doctrine of the Godhead, the absolute unity of the divine essence, and the absolute equality of the three persons. All the bishops subscribed it except two, Theonas of Marmarica and Secundus of Ptolemais, who had the heroism (for it must be considered such) to follow the banished A. into Illyricum.

An imperial edict was now issued commanding the writings of A. to be burned, and threatening with capital punish-

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ment all who should be convicted of concealing them. This change in the emperor's sentiments as to the importance of the doctrine at issue is attributed by some writers to his recognizing the will of Heaven in the harmonious consent of so many bishops. A more probable explanation is, that he anticipated the utmost social confusion from the collision of opinion, and resolved to crush that which was at once the youngest and the weakest, hoping thereby to remove the ground of disturbance. He misjudged, however. At Alexandria, the Arians continued in a state of open insurrection, and began to league themselves with other condemned sects, for mutual defense. The great influence of Eusebius was also exerted on behalf of the exiled heretic, as well as that of Constantia, the sister of the emperor, who had herself embraced Arian tenets, and in 328 permission was granted him to return from Illyricum. Constantine was very gracious, perhaps because he thought the chances of peace being restored to the community were now greater, for it had been represented to him by Eusebius that the doctrines of A. did not essentially differ from those of the Nicene Council. In 330, A. had an interview with the emperor, and succeeded in convincing him that Eusebius had spoken the truth. In the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that as the 'Word,' he had made all things both in heaven and earth. The emperor was satisfied, and sent orders to Athanasius, now Bishop of Alexandria, to receive A. into the communion of the church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius was greatly irritated. He called a synod of bishops at Tyre, 335, which proceeded to depose Athanasius. The emperor was even prevailed on to remove the latter to Gaul, though he alleged as his reason, that he wished to deliver him from the machinations of his enemies. In the same year, another synod met at Jerusalem, which revoked the sentence of excommunication uttered against Arius and his friends. Still the majority of the Christians of Alexandria clung to the doctrines of Athanasius, and resolutely resisted every effort to establish the new opinions among them. Disappointed in his expectations, Arius in 336 proceeded to Constantinople, where he presented the emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, Bishop of Constantinople, to administer to Arius the holy communion on the Sunday following. This was considered a grand triumph by Eusebius and his friends, and when the day arrived, they escorted A., as a guard of honor, through the streets of the metropolis. When about to enter the temple, in which it was intended that he should be received with solemn pomp, he retired a moment to relieve nature, but fainted, and died of a violent hemorrhage. His disciples declared that he had been poisoned, while the orthodox devoutly affirmed that God had answered the prayers of Alexander.

A. was exceedingly handsome, but the harassing cares of a life spent in a continual struggle with his adversaries are

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said to have given him a worn and haggard look. His manners were graceful and modest; he was noted for even an ascetic abstinence, and the purity of his moral character was never challenged.

After the death of A., his followers rallied round Eusebius, now Bishop of Constantinople (338), from whom they were styled Eusebians. The reconciliatory middle party of Eusebius of Cæsarea (died 340), who wished to end the great controversy by abstaining from all strict dogmatic assertions on the matter, soon dwindled into insignificance between the two contending parties. Constans, who ruled the West after the death of Constantine (337), and Constantius, in the East, made an essay towards reconciliation; but it failed at the synod of Sardeis (347), where the occidental bishops gathered themselves round Athanasius in support of the *Homoousian* doctrine (identity or *sameness of substance*), while in a separate council at Philippopolis, the oriental bishops asserted the *Homoiousian* doctrine (implying merely *similarity of substance*). Slight as might appear the verbal difference between the two parties, the bitterness of the controversy was intense, and pervaded almost all departments of public and private life. Constantius having, by the death of Constans (350) and conquest over Magnentius (353), gained dominion over the West, the Arian cause, which he favored, triumphed at the synod of Arelate or Arles (353) and at that of Milan (355). The Nicene doctrine had still strong support on its side, and was strictly maintained by the banished Athanasius and his friends, while the Antinicæans, soon after their triumph, were divided into at least three parties. The old Arians, also styled Anomœoi, or Heterousians, asserted, in the boldest style, their doctrine of 'distinct substances.' The semi-Arians (a large majority in the Eastern Church) maintained the Homoiousian doctrine of similar substances. A third party held the same doctrine with some qualification. Morally, the victory was leaning to the side of the Nicæans. Julian the Apostate (361–363), in his hatred of the Christian religion, left all parties at liberty to contend as they pleased with one another, so that they did not interfere with his plans. Jovianus and his followers in the West, Valentinianus I., Gratianus, and Valentinianus II., extended full toleration to both parties. Arianism, at last, was virtually abolished in the Roman empire, under Theodosius in the East (379–395), and Valentinianus II. in the West. Among the German nations, however, it continued to spread through missionary efforts. Bishop Ulfilas, the translator of the Bible into the Mæso-Gothic language, had been the means of converting the West Goths to Arian Christianity as early as 348; and they adhered to it until the synod of Toledo in 589. The East Goths, Vandals, Burgundians, the Suevi in Spain, and the Longobards also adopted Arianism; but in all these instances the Nicene doctrine ultimately prevailed, most slowly among the Longobards, who retained the Arian creed until 662. Pure Arianism can hardly now be said to exist. It has gradually lapsed into Unitarianism. See UNITARIANS.

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ARIZONA, *ăr-ĭ-zō'nă:* one of the territories of the United States, in the s.w. part, separated from the Pacific by s. California and by the rocky and arid desert of Lower California. It lies between the parallels of 31° 20′ and 37° n. and the meridians of 109° and 114° 35′ w. Its latest computed area according to land office reports is 113,916 sq. m., or 72,906,240 acres. It has been only partially surveyed, however, and its area is believed to be much greater than this, roughly computed at about that of New England, New York, and New Jersey. A. is bounded on the n. by Utah, the 37th parallel forming its n. boundary as far w. as the 114th meridian. From the 36th parallel s., the w. boundary is irregular, following the course of the Colorado river. The s. boundary runs w. along the parallel of 31° 20′ to the 111th meridian, and then n.w. to 32° 30′, where it strikes the Colorado. A. is bounded on the e. by New Mexico. A. occupies a large part of the plateau region, the s. continuation of the Great Basin mountain ranges, and a portion of the group of ranges of which those on the s. coast of California are members. The prevalent character of the surface is arid, and in the s.w. portion are large tracts of shifting sands. The highest known mountain elevation is Mount San Francisco, at the northernmost end of the plateau of that name, and whose summit is 12,700 ft. above the level of the sea. But although the general appearance of the surface of the country is mountainous and forbidding, the variety being desert spaces, *mesas*, or table-lands, void of water, yet there are many valleys of great natural beauty and fertility; the valleys of the Colorado Chiquito and Rio Salinas being true garden-spots, while in the surrounding mountains are excellent stock-ranges, with fine grazing and plenty of water. Even the table-lands, when properly irrigated, prove wonderfully productive, yielding 65 bush. of wheat of fine quality to the acre, and producing Indian corn and root-crops in enormous quantities. The water-ways of A. are the Colorado and Gila rivers, with their tributaries. Here the bottom-lands are fertile, but the valley below the cañons is barren and unproductive. The n. section of the territory is well wooded and fertile, the grass is inexhaustible, and water is accessible; here, too, are the invaluable mining districts. S.e. Arizona lacks both water and timber. The n.w. portion is well timbered with juniper and pine, and there are numerous large springs and lakes. The face of the country in the extreme n.e. presents a succession of mountain ranges and valleys, the hills being covered with forests of yellow pine. Here, however, as in so many parts of A., is great scarcity of water. The most remarkable feature of the topography of this territory is the tendency of its rivers and streams to form cañons of vast depth with precipitous sides. It seems as though these waters had been endowed with a force elsewhere unknown, to enable them to cut their way to the Gulf of California through such gigantic mountainous masses of rock. The entire territory is drained by the Colorado and its tributaries, with the result of the arid condition of the interior. Many of these tribu-

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taries are themselves considerable streams, rushing each through its own gloomy and cavernous cañons; but the majestic Colorado is the monarch of them all. This tremendous and swift river, increased by the waters of nearly 200 streams, large and small, covers a descent of more than 3,000 ft. in 600 m. The Great Cañon of the Colorado is one of the natural wonders of the world, whose secrets were never disclosed until the memorable and fatal expeditions of Maj. J. W. Powell, 1869 and 1871, made them known to the world. Through its whole course there is a succession of cañons, which give this river an aspect possessed by no other in the world. At irregular intervals the rapid current plunges down steep declivities a distance of from 75 to 350 ft. The walls of the Grand Cañon are at some points more than a mile in height, dark gorges where the sun never penetrates except for a few moments at high noon. The vast, frowning masses of rock display the most wonderful freaks of nature, being battlemented, scarped, castellated, and pinnacled, after a fashion most grand and impressive. From the termination of the Grand Cañon the Colorado is navigable, though with difficulty, owing to the numerous rapids, to its mouth, a distance of 612 m. The deep cañons of the principal rivers render enormous tracts of land unfit for anything except grazing, and even that with difficulty, owing to the extreme scarcity of water at any distance inland.

Geology.—The exploration of the geological and mineralogical conditions of A. have been confined mainly to the portion of the territory just described. It is estimated that the Colorado river has cut through strata representing a thickness of 25,000 ft., nearly five m. of vertical height, exposing in its course every geological formation found in North America, from the quaternary alluvial deposits to the primary azoic rocks, with intervals showing the alterations effected by volcanic action. About 16,000 ft. of these strata are in A., displaying the superficial deposits, alluvium, possibly diluvium, clay, and sandstone detritus, etc. In the n.e. part of the territory are coal-beds, anthracite, and excellent in quality. There are also marbles and sandstones of all colors, granites, and other valuable building-stones. The mineral wealth of A. is great, in veins and placers of gold, silver, copper, and lead, and carbonates and oxides of iron, platinum, and quicksilver. widely distributed. Gold is found free in both placers and quartz lodes; silver in galena, and combined with lead, and copper as sulphides and carbonates; copper is found in the form of gray sulphurets; quicksilver in the form of cinnabar and possibly other combinations; tin, platinum, and nickel, nearly pure; iron ores of all kinds, and well situated for producing the finer qualities of iron and steel. Besides the anthracite coal in the n.e., there is bituminous coal adapted to smelting purposes, at Camp Apache and elsewhere. Immense deposits of salt of the purest quality have been found, and there are large beds of sulphur, gypsum, hydraulic lime, valuable mineral springs, natural lodestones of great magnetic power, and fossil woods of many varieties. There are also opal

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pebbles; garnets, red, white, and yellow; azurite, malachite, chalcedony, sapphires, opals, and possibly some diamonds. The plains appear to be altogether of quaternary and tertiary deposits. In the Colorado valley the sedimentary strata consists of quaternary and tertiary gravels and conglomerates, varied in a few localities with white infusorial earth. The bottom-lands consist of calcareous sands and clays. A section of the Grand Cañor shows the following order: Upper carboniferous limestone; cross-stratified sandstone; red calcareous sandstone with gypsum; lower carboniferous limestone; limestones, shales and grits—Devonian; limestones, mud rocks, and sandstones—Silurian; Potsdam sandstone, granite.

Botany.—The vegetation of s. and w. A. is scanty, limited to a few genera, such as cactus, aloe, artemisia, iron-wood, and mesquite. In the middle and n.e. the vegetation is more generous, including rich grasses, pine, and cedar forests; and in the river-bottoms ash, walnut, cherry, willow, cottonwood, and on some of the mountains oak. Wherever the land can be irrigated, it is found that a full growth may be obtained of Indian corn, wheat, barley, oats, grapes, figs, oranges, lemons, sweet potatoes, tomatoes, tobacco, and the castor-bean. In the valleys of middle and e. Arizona there are broad sections of arable land, where all the cereals and root-crops of the n. Atlantic states can be grown, while this region is unsurpassed as grazing land; a thick growth of gramma and bunch grass extends all over it.—The climate of A. varies in the different parts. In the central portion snow falls but does not lie. In s. A. the temperature ranges between 34° and 118° F. The atmosphere is dry, and this region is not subject to malarial disorders; the average rainfall is between 3 and 8 inches. The climate of A. is recommended by physicians as beneficial to constitutions impoverished by bronchial or lung diseases. The temperature in summer rarely exceeds 90°, and in winter generally remains above zero. The largest quantity of rain falls in July and August.

Zoology.—Wild animals are not numerous in A. There are two species of deer, the Rocky Mountain antelope, the bighorn, or mountain sheep, and the Rocky Mountain goat. The black and cinnamon bears are somewhat numerous; the puma or cougar is found in the forests, and the jaguar in the lowlands; there are also occasional instances of the finding of the ocelot, the wild-cat, and the lynx, as well as the gray wolf, and one or two species of fox; the prairie wolf, or coyote, does not exist in the territory, but there are peccaries, raccoons, opossum, skunks, and the gopher, or prairie-dog. Large herds of mustangs, or wild horses, are said to roam over the plains of s. A. There are large numbers of birds, 183 distinct species having been sent to the Smithsonian Institution by the Wheeler expedition. Game birds include pheasants, partridges, quails, and grouse, the sage-hen, and prairie-hen. Eagles, vultures, buzzards, and owls are numerous, and here is found—the only place in North America—the king vulture, little inferior in size to the condor, or lam-

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mergeier of the Andes. There are many varieties of fish, some of them peculiar to the territory. The reptiles and serpents are formidable, and in some parts very numerous. In the Gila and Lower Colorado, alligators are found; horned toads, lizards, scorpions, and centipedes flourish in the chapparal and among the cacti; and the table-lands offer a home to large numbers of rattlesnakes. Strangely the skunk is here found dangerous, from its carnivorous propensities, attacking the exposed limbs and features of sleepers, the bite being not only savage, but said to produce a condition similar to hydrophobia.

Agriculture.—In 1880 the farm lands covered 135,573 acres (of which 56,071 were improved); comprised 767 farms, valued, with fences and buildings, at $1,127,946; contained implements and machinery valued at $88,811; had live-stock valued at $1,167,989; and yielded products valued at $614,327.—In 1890 the principal cereal productions were: barley 252,992 bushels, from 16,644 acres; corn 82,535 bushels, 4,331 acres; oats 33,996 bushels, 1,472 acres; and wheat 100,328 bushels, 6,225 acres. Official estimates 1892 gave wheat 170,000 bushels and corn 81,000.—1893, Jan. 1, the farm and ranch animals comprised: horses 52,175, value $1,565,250; mules 1,340, $67,000; milch cows 16,907, $355,047; oxen and other cattle 822,154, $12,414,525; sheep 580,879, $1,306,978; and swine 19,536, $122,100—total head $1,492,991, value $15,830,900. —In the 10 counties, Apache, Cochise, Coconino, Gila, Graham, Mohave, Maricopa, Pima, Yavapai, and Yuma, there were (1892) 512 m. of irrigating canals, not including laterals, by which 343,000 acres have been reclaimed, and a total of 1,730,000 acres are still capable of being reclaimed under the present water development; and in the whole territory it is believed that fully one-third of the area, or about 24,000,000 acres, could be reclaimed with sufficient capital and adequate storage facilities. The agricultural experiment station, with headquarters at the Univ. of A., is doing invaluable work for the agricultural development of the territory by the various investigations it is conducting.

Mining.—Gold and silver mining was prosecuted by the Spaniards and Mexicans long before the country came into the possession of the United States, and some mines were exceedingly productive, including the Cerro Colorado, Mowry, Santa Rita, Salero, Cahuabi, San Pedro, and the celebrated quicksilver mine of La Paz. All the explored portion of A. below the 36th parallel has been divided into mining districts, the most numerous lying in the s.e., including the Dos Cabezas district, Sierra Bonita, Dragoon Range, Globe, Tombstone, Huachuca, Patagonia, Washington, Harshaw, and Santa Rita.—The mineral product of A. 1892 was: copper $4,500,000; gold $3,000,000; and silver $2,200,000; total $9,700,000, or an increase of more than $2,000,000 over the previous year. The most valuable copper mines were in Cochise, Gila, Yavapai, and Graham cos.; gold, Yuma, Yavapai, and Pima; and the most notable silver mines are at Tombstone, Cochise co.,

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though there was a little production in every mining co. in the territory. Continued prospecting, extension of railroads, and opening of new stage routes are daily increasing the development of the natural resources of the territory. Large deposits of onyx, of a quality declared first-class by competent experts, have been discovered in various localities, and the quantity bids fair to be large. Coconino co. is developing a first-class building sandstone, and Yavapai co. a large and valuable deposit of red and gray sandstone. The development and exportation of building stone is expected to increase largely because of the recent act of congress authorizing the location and titling of land containing building stone.

Commerce.—During 1892 the total value of foreign commodities imported into A. was $2,879,998, of which $2,744,543 were non-dutiable. The revenue collections aggregated $49,998; almost the entire revenue of the district was derived from the duty on lead and copper contained in silver ore imported from Mexico. The ore importations included gold $6,152 oz., value 126,134; silver 1,501,822 oz., value $1,327,874; lead 2,284,459 lbs., value $65,814; and copper 266,885 lbs., value $13,349—total value of ores $1,533,171; aggregate value of gold and silver bullion and coin imports $1,228,737.

Railroads.—The railroad system of A. shows the following development: (1850) 183 m.; (1860) 743; (1870) 1,157; (1880) 1,843; (1890) 3,422·20; (1892) 3,596·47.

Education.—The common-school system is firmly established on a carefully constructed code. The school age, which was formerly from 6 to 24 years, is (1893) from 6 to 18 years, and all children between these ages, excepting Chinese and the children of Indians not taxed, are entitled to admission and free education; and if unable to procure text-books, they are furnished them by the district. Each district, under recent laws, must maintain a school for five months each year, to secure its proportion of county moneys. The general school fund is derived from a direct tax on all property of each county at a minimum rate of 75 cts. per $100 of assessed property; also from per capita tax, gamblers' and liquor licenses, fines, forfeitures, penalties, etc.; and the fund is proportioned for the use of districts according to the number of children therein, as ascertained by annual census. The school buildings are ample, comfortable, and adequately furnished. Fully one-third of the children of school age are enrolled in the public schools, and nearly one-half attend at least a portion of the year. The grammar-school course is so graded that its completion meets the requirements for admission to the Territorial Normal School at Tempe, which, with the Univ. of A., provides a complete system of public school education.

Archæology.—Evidences exist all over A. that a very large population once occupied this part of America. Ruins of extensive buildings and large towns can be found in every valley of southern A., and ancient waterways line every agricultural section. Modern irrigators have

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surveyed ancient canals and found them to run under eruptive lava. Authorities differ as to the cause of the extermination of the cliff and cave dwellers and the residents of the once populous communities—whether by earthquake, epidemic, or warfare; but there are everywhere evidences of a hasty departure of former occupants, and there is much similarity between the pottery and utensils of the present natives and those of the people who are gone. The oldest Indians living say that their traditions tell them that these ruins were there when their people came. It is interesting to note that the general govt. has taken steps to preserve some of the most notable ruins, especially those of Casa Grande; and Gov. Murphy urged (1892) the appointment by the govt. of an ethnological commission, believing that startling discoveries can and will be made in that region affecting the history of the human race. It is interesting to note that a party of Mexican laborers, digging in the extension of the Santa Cruz canal in 1892, Mar., discovered one of the strangest of the old Aztec cities, about 20 ft. below the surface of the ground. The largest building was a triangular structure 300 x 200 ft., and in it were 18 bodies, all of medium size, and mummified. The territorial exhibit at the Columbian World's Exposition included the largest relief map ever made, showing in detail all the pre-historic views of the valleys of the Salt and Gila rivers, and giving a bird's-eye view of nearly 1,000 sq. m., which it is estimated once supported a population of 2,000,000 to 3,000,000 people who have passed into oblivion without leaving a tradition as to whence they came, or when and why they disappeared. This map was prepared under the direction of Prof. F. W. Putnam, of Harvard University.

Finances and Banking.—The assessed taxable property of the territory, 1892, aggregated $27,923,162.55, the largest items being, railroad property $6,038,893.41; cattle $5,038,207; improved farm lands $4,748,962.43; city and town lots $2,266,883.50; and improvements thereon $2,453,068.20. The rate of taxation differed in each co., the average for all purposes being $3.27 per $100 valuation, 80 cts. of which was for territorial purposes solely. The territorial indebtedness, bonded and floating, including interest, was $860,829.85; county indebtedness $2,305,084.50; and cities' indebtness $188,811.46—total $3,354,725.81. In 1892, Sep., there were 4 national banks (cap. $300,000); 5 incorporated banks (cap. $275,200); 4 private banks, and 3 state banks (cap $150,000).

History.—The first modern exploration of A. known to history was by the Spaniards. As early as 1526, Don José de Vasconcellos crossed it in the direction of the Grand Cañon, and later it was visited by other Spanish explorers, evidences of whose settlements are still found. But long before this A. is known to have been the seat of an extensive and civilized race, whose remains exist on the Colorado plateau and in the Gila basin, comprising the walls of considerable structures, built of solid masonry, quantities of finely made and ornamented pottery, ruins of care-

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fully constructed fortifications, evidences sufficient to give basis for the estimate that at least 100,000 people occupied the valley of the Gila alone. Ruins of old arastras, or smelting works, show that silver mining was practiced by the ancient races, and occasionally the bones of human beings are brought to light, surrounded by the implements and appurtenances of domestic life. That the Moquis are descendants of one of these ancient races is assumed from their dwellings, some of which date back in their construction to a high antiquity. The Moquis live in the n.e. part of the territory, in the ancient province of Tusayan. They are pagans by religion, and many of their prayers and invocations indicate conditions of the highest antiquity. Their dwellings are of stone usually placed on some elevation, and three or four stories in height. There are more than 60 towns discoverable, of buildings of this character, only seven or eight of which are now occupied.—The history of A. as a territory of the United States begins in 1848, when, by the treaty of Guadalupe Hidalgo, the territory of New Mexico was ceded by the Mexicans to this country, including that portion of A. lying n. of the Gila river. The portion lying s. of that river was acquired 1853, Dec. 30, by what is known as the "Gadsden purchase" from Mexico, for $10,000,000. An act of congress passed 1863, Feb. 24, gave this land a political status as the territory of A.

Government.—The executive authority, according to acts of congress under which all the territories were organized, is vested in a gov., appointed by the pres. for a term of 4 years, salary $3,500 per annum; the legislative in a legislature comprising (1893) a council of 12 members and a house of 24, all members elected by the people; and the judicial in a supreme court consisting of a chief-justice and three assoc. justices, appointed by the pres., a dist. court, and the usual court officers. The gov. is assisted by a territorial sec., treas., auditor, adjt.gen., supt. of public instruction, and atty.gen.—The successive govs., with their terms of service, are as follows: John A. Gurley 1862–3; John N. Goodwin 1863–66; Richard C. McCormick 1866–69; A. P. K. Safford 1869–76; Charles E. D. French 1876–7; John P. Hoyt 1877–8; John C. Fremont 1878–82; Frederick A. Tritle 1882–85; C. Meyer Zulick 1885–89; Louis Wolfley 1889–91; John N. Irwin 1891–2; Nathan O. Murphy, 1892–3; Louis C. Hughes 1893–7; Benjamin J. Franklin 1897–.

Counties, Cities, and Towns.—In 1880 the 7 cos. had pop., Pima 17,006; Maricopa 5,689; Apache 5,283; Yavapai 5,013; Yuma 3,215; Pinal 3,044; and Mohave 1,190. The cities and towns were: Tucson 7,007; Prescott 1,836; Phœnix 1,708; and Yuma 1,200.—In 1890 the 10 cos. had pop., Pima 12,673; Maricopa 10,986; Yavapai 8,685; (Coconino co. was organized from part of Yavapai in 1891;) Cochise 6,938; Graham 5,670; Apache 4,281; Pinal 4,251; Yuma 2,671; Gila 2,021; and Mave 1,444. The cities and towns were. Tucson 5,150; Phœnix 3,152; Tombstone 1,875; Yuma 1,773; Prescott 1,759. Cap. Phœnix.

Population.—(1880) 40,440; (1890) 59,620.

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ARK, n. *ärk* [AS. *eark:* L. Sp. and It. *arca*, a chest]: among the *anc. Jews*, an oblong chest or case in which were deposited the two tables of the law, and over which was the mercy-seat; a chest; a vessel; the large vessel or floating structure that was a place of safety to Noah and his family at the Flood. It was 300 cubits long, 50 wide, and 80 high; but as we do not know the length of the cubit, this simply gives us its proportions. It probably had little resemblance to a ship, but was more like an oblong house. The A. of bulrushes, in which Moses was protected, was made of papyrus reeds and covered with slime to keep out the water. The word Ark is used figuratively for a place of shelter. See also ARK OF THE COVENANT. ARKITE, n. *är'kīt*, one of the persons saved in the ark: ADJ. pertaining to the ark of Noah.

ARKADELPHIA, *ärk-ă-dĕl'fĭ-ă:* t. of Clark co., Arkansas, 65 m. s.w. of Little Rock, on the Ouachita river, and on the Arkansas division of the St. Louis, Iron Mountain & Southern r.r. It contains a Baptist college, a newspaper office, and several churches. Pop. abt. 2,000.

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ARKANSAS, *ăr'kan-saw* or *ăr-kăn'sās:* one of the United States, in the s. central part: having the Missouri river on the n.; the Mississippi on the e., separating it from Tennessee and Mississippi; on the s. Louisiana and Texas; and on the w. Texas and Indian Territory; 53,850 sq. m., or 34,464,000 acres. The surface of A. is varied, the Ozark Mountains crossing it from n.e. to s.w., with outlying spurs, or subordinate ranges, including the Black Hills in the n., the Ouachita Hills in the s., and the Cane Hills in the n.w. To the s. are broad prairie districts, and the remainder of the state is diversified between hills and fertile and beautiful valleys. The entire state is rich in timber, including vast forests of pine, the different species of oak, pecan, hickory, locust, walnut, cypress, cedar, and others. Arkansas has no sea-coast, but it is remarkably well provided with navigable streams. The Mississippi river, which separates the state from Tennessee and Mississippi, extends along its whole eastern border—a tortuous course of nearly 400 m. Of this great stream, one of the largest affluents is the Arkansas river, which rises in the Rocky Mountains, traverses the centre of the state in a general s.w. direction, about 1,500 m., and is navigable from its mouth into the Indian Territory. The Red river, also navigable, rises in New Mexico and flows through the s.w. part of the state, to the great commercial advantage of Sevier, Lafayette, and Hempstead counties. In the Ozark Mountains of Missouri rises the St. Francis river, which is for a short distance the boundary between Missouri and Arkansas, and which runs into the Mississippi a little above Helena, crossing the n.e. corner of the state. This also is a large river, but its navigation is greatly impeded by snags. At one point the St. Francis widens into a lake, some 50 m. long, and from 5 to 20 m. wide, a phenomenon supposed to have resulted from a sinking of the earth caused by the great earthquake of 1811. The St. Francis is 450 m. long, navigable at certain seasons for a distance of about 150 miles. White river rises in the n.w. corner of the state, runs n. into Missouri, then returns and takes a crooked course in a generally s.e. direction through A., emptying into the Mississippi a few miles above the mouth of the Arkansas. This river is about 600 m. long, navigable from 300 to 400 m., according to the season. The Black river is a tributary, navigable about 100 m.; the Spring river is another less important affluent. The Wachita or Ouachita river rises s. of the Arkansas river in the w. part of the state, and runs s.e., parallel with that stream, fertilizing the richest portion of s. Arkansas, and then runs through a part of Louisiana, emptying into the Red river near the junction of the latter with the Mississippi. It is navigable for about 350 m. from its mouth, and has for tributaries the Little Missouri, Sabine, Saline, Bayou Bœuf, etc. In Pike county, on the Little Missouri, is a natural bridge, one of the curiosities of the state. It is an objectionable feature of the low river valleys of Arkansas, that they are deficient in springs, or any good, potable water. As a consequence, the river water itself is used for drinking and

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culinary purposes, after being filtered, and rain water is collected and kept in large tanks sunk in the ground.

A line drawn across the state from s.w. to n.e., following that of the St. Louis, Iron Mountain and Southern railway, divides the upper mountainous, forest and mineral lands from the lowlands and alluvial plains. In the n. part are rich mineral deposits. Coal is known to exist in twelve counties watered by the Arkansas river, the mineral being a high-grade semi-anthracite, comparatively little worked, and supposed to cover an area of 12,000 sq. m., the veins varying between one foot and nine ft. in thickness, and from 50 to 60 ft. below the surface. There are also cannel and bituminous coals is abundance; iron ore of excellent quality is plentiful in the Ozark Mountains; zinc ore is more abundant than in any other state except New Jersey. Galena, or lead ore, frequently bearing silver, is found in different parts of the state; gold has been found in some sections, manganese is abundant, and it is believed that A. contains more gypsum than all the other states of the Union. Oil-stone of a superior quality exists in an immense bed in the Wachita valley, and salt is produced from the saline springs in the same vicinity. The formation of the land along the banks of the Mississippi river, in the e. part of the state, presents a strip ranging from 30 to 100 m. wide, low and flat, covered with dense forests, interspersed with swamps and small ponds, sometimes of stagnant and unhealthy water. This land is annually overflowed at the recurrence of the floods of the Mississippi. From this section, westward, the land gradually rises, near the centre of the state becoming hilly, these hills terminating in the Ozark Mountains, still further west, beyond which an extensive elevated plain continually increases in height towards the Rocky Mountains, in which it terminates. The valley of the St. Francis river, in the n.e. part of the state, is a continuous swamp, filled with shallow lakes and bayous, and covered with a heavy growth of cypress, gum, and sycamore; on the higher land the growth is white-oak and hickory, with occasional thickly set cane-brakes. Besides the minerals already mentioned, A. has extensive beds of lignite, millstone, and grindstone, porcelain clay, mineral ochres, and granite and other building stones. Among the natural objects of curiosity and importance are the numerous mineral and medicinal springs, and the celebrated Hot Springs, about 60 m. s.w. from Little Rock, visited annually by thousands. These springs are strongly impregnated with carbonic acid, alkalies, and carbonates, and have a temperature varying between 93° and 148°; they are claimed to effect positive and permanent cure in the case of a number of chronic diseases. But the mineral springs are not confined to the 'Hot Springs' district. There are many in different parts of the state, and one in Fulton co. discharges 15,000 bbls. of water per hour, and is in constant action at a temperature of 60°.

The soil of A. of course varies with the varying characteristics of the geology and surface conditions. The river bottom lands are the most valuable in an agricultural

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view, being capable of producing luxuriantly tobacco, corn, cotton, sweet potatoes, grapes, peaches, melons, and other fruits. As the land rises from these bottoms, it becomes less productive, but there are immense tracts submerged, which, if drained properly, would present the finest agricultural advantages. The rolling prairies of the uplands are generally well watered, though there is a notable exception in the case of Grand Prairie, 90 m. long and 30 broad, lying between the Arkansas and White rivers, almost entirely destitute of water. Besides the natural products already mentioned, there are the sassafras, maple, and mulberry among trees, the osage-orange, which grows luxuriantly, the beech, ash, elm, cotton-wood, willow, holly, butternut, juniper, plum, dogwood, palmetto, laurel, ironwood, scrub oak, hazel, sumac, and others. There are also wild plums, haws, persimmons, pawpaws, whortleberries, and chinquapins. Among the fruits are apples, apricots, nectarines, cherries, strawberries, etc. Any of the cereals grow readily; there are numerous varieties of native grasses, and though cotton is the staple product of the state, the crop of hay is not far behind it in importance. Game abounds in the forests and prairies, including deer, bear, wild turkey, prairie hen, and quail; the streams abound in fish; there are few alligators; different species of snakes abound in certain sections. The climate of A., though generally temperate, is subject to fierce north winds which produce sudden and violent changes. The average mean temperature at Little Rock is 62° 66′, the extremes being 15° and 99°, with an occasional lower fall. The rain-fall is heavy, and violent thunder storms occur in the spring and summer.

A thorough geological survey of A. was made 1887–92, with results of which the state may be proud.

Agriculture.—In 1880 the farm lands covered 12,061,547 acres (of which 3,595,603 were improved); comprised 94,433 farms, valued, with fences and buildings, at $74,249,655; contained implements and machinery valued at $4,637,497; had live-stock valued at $20,472,425; and yielded products valued at $43,796,261.—In 1891 the principal cereal productions were: corn, 39,982,318 bushels, from 1,648,443 acres; oats, 4,180,877 bushels, 288,332 acres; and wheat, 955,668 bushels, 140,464 acres. The cotton crop was 691,423 bales, from 1,700,612 acres. Official estimates 1892 gave: corn, 34,344,000 bushels; oats, 4,988,000; and wheat, 1,337,000.—1893, Jan. 1, the farm and ranch animals comprised: horses 190,820, value $9,916,082; mules 137,139, $8,871,887; milch cows 338,863, $3,896,925; oxen and other cattle 711,278, $5,782,338; sheep 240,326, $361,714; and swine 1,563,322, $4,689,967—total head 3,181,748, value $33,618,913.—The estimated acreage of cotton 1892–3 was 1,325,335.

Railroads.—The railroad development of A. before 1880 was not rapid, perhaps owing to the fact that the supreme court had declared $5,350,000 railroad aid bonds illegal. In 1860 there were 38 m.; 1880, 859 m.; 1892, 2,348 miles.

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Manufactures in Arkansas are increasing rapidly in importance, the total number of establishments, 1880, being 1,202 compared with 261 in 1850; the value of the product being $6,756,159, compared with $537,908 in 1850. In 1880, the number of hands employed was 4,557, the amount of wages paid being $925,358. The specified industries of most importance were lumber, of which the product amounted to $1,793,848; flouring and grist-mill products, $2,249,289; oil, cotton-seed and cake, $590,000; the balance scattering.

Mining.—In close proximity to the coal-beds are inexhaustible deposits of hematite and other iron ores, with limestone, and hard-wood for charcoal near at hand There are also convenient, large and never-failing water powers. In the n. part of the state zinc mines have been opened with some success, also lead and silver. The oldest mine in the state is in Pulaski county, and contains lead, copper, pyrites, and zinc blende; it is eight m. from Little Rock. Since the war considerable exploration has been made, and it is thought that a mineral belt runs from Little Rock s.w. through the counties of Pulaski, Saline, Montgomery, Garland, Hot Springs, Polk, Pike, and Sevier. In Polk co. manganese of fine quality has been discovered; in Garland co., lead, copper, and the celebrated novaculite hone-stone, also tripoli. Saline co. is among the richest in mineral wealth; containing iron, copper, lead, argentiferous galena, and nickel; steatite (soapstone) and serpentine also are found in this county. In Logan co. is a fine quality of micaceous fire-clay, and Carroll co. produces a beautiful quality of pink marble. But little capital has been invested in mining in A., though it is conceded to offer a rich field for investment in that direction.

The commerce of A. is mainly domestic, and mostly by means of the Mississippi river, the Arkansas and other navigable waters. The export trade of the state covers cotton, corn, oats, wool, lumber, hides. A very important and growing business interest has sprung up from the popularity of the hot and medicinal springs, which draw visitors from all parts of the country, thus giving a considerable impetus to industry, and awakening extended interest in the local resources.

Education.—Although the popular interest in public instruction has not been as deep or as enthusiastic in A. as in some older states, the improvement in recent years has been very encouraging. The great deficiency is in the means for normal training, resulting in a lack of competent teachers. It appears that few children are sent to school before seven years of age, while few remain after seventeen, facts which indicate the need of better primary and high school facilities, respectively. The school system of A. is under the administration of (1) a state superintendent of public instruction elected by the people for two years; (2) a board of commissioners of the common school fund, of which the superintendent is secretary; (3) a county examiner for each co., appointed by the county courts, and

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(4) district directors, three for each district, elected by the people for three-year terms, with liability to change of one each year. Annual reports of school statistics are made by the district directors to the county examiners, by the examiners to the state superintendent, and by him to the governor. Directors failing in this duty are liable to a heavy fine. Teachers are required to keep a register of school statistics and make full monthly reports, on penalty of loss of a month's pay. In the intervals of public schools, they are permitted to teach private schools in the school buildings. Separate schools for whites and blacks are required, as in the other southern states. The prescribed studies are the ordinary English branches, there being no provision for high schools, except in the cities and large towns. The books for study are selected by the state superintendent. The means for the support of the state system of public schools are derived from the income of a state school fund, from a per capita tax of $1 on men over 21, from such appropriations as the legislature may set apart, and from optional district taxes, the last limited to 5 mills on $1 of the assessed value of property subject to taxation.—In 1890 the children of school age numbered: white 297,904, colored 107,683—total 405,587, and the enrolment was: white 154,259, colored 51,003—total 205,262. During the year $869,899 were paid in wages to teachers and $1,016,776 expended for all public school purposes. The permanent school fund 1893, Jan. 1, was nearly $650,000. The State Industrial Univ. was better equipped in every dept. than heretofore; the number of matriculates and the average daily attendance 1891–2 were largely in advance of previous years; the curriculum has been raised to a higher standard; and the mechanical and agricultural depts. were yielding large practical results. An appropriation of $125,727 was asked by the univ. for 1893–4. The medical school of the State Univ., at Little Rock, was amply equipped, had a faculty of 15 prominent physicians and surgeons, and graduated (1891) 16 students, (1892) 25. In the branch normal school for colored youth, machine shops have been erected, and mechanical training is in successful operation. The school for the blind had 1892, Dec., 198 pupils and 49 teachers and employés; and the deaf-mute institute, 138 pupils and 35 teachers and employés.

History.—Originally a portion of the territory of Louisiana, purchased from Napoleon I., 1803, for $15,000,000, the present state of Arkansas seems to have derived its designation from the name applied by the Algonquins to a specific tribe of Indians which had their habitat within its borders. In the early French documents the word is written *Alkansas.* In 1812, the present state of Louisiana was set apart from the rest of the purchase and admitted into the Union, and the remainder was organized as Missouri territory, and continued as such until 1819, March 2, when Missouri in turn became a state, and the present state of A. a separate territory under that name. From this time until 1836, June 15, the government was territorial. At

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that time a convention at Little Rock framed a constitution, and A. was admitted as a state. Its progress was generally slow, although it nearly doubled in population every ten years to 1860. In 1861, Jan., a popular vote was held on the question of appointing a convention to decide with regard to secession, and it was decided in favor of the convention by 27,412 to 15,826. The convention met in March and again in May, when a secession ordinance was passed by a practically unanimous vote. In the meantime the various arsenals had been seized by the state authorities, and a year later, March 6 and 7, 1862, was fought the decisive battle of Pea Ridge between the Confederates, led by Gen. Van Dorn, and the Union forces, by Curtis, in which the latter was the victor, and at once seized and occupied Helena. Another serious defeat of the Confederates was that of 1863, Dec. 7, when Gen. Hindman was worsted at a point near Fayetteville by Gen. Blunt, losing about 1,200 men. On Jan. 11, following, Gen. McClernand and Admiral Porter captured Arkansas Post on the A. river; and 1863, July 4, Gen. Prentiss defeated the Confederates under Gen. Holmes, in their attempt to recapture Helena. The disasters of the Confederates culminated in the capture of Little Rock, 1863, Sep. 10, by an expedition commanded by Gen. Steele, and on Oct. 30 the first step was taken looking towards the re-establishment of a state govt. in a public meeting at Fort Smith. In 1864, Jan. 8, a convention at Little Rock continued this movement by framing a loyal constitution, and on this being put to vote at a general election in March, it was carried, and entire state, county, and congressional tickets elected, and by April the new state organization was in full force. Under the reconstruction acts of 1867, A. and Mississippi became the fourth military district. It was not until 1869, March 22, that martial law ceased throughout the state.

Finances.—During its early history A. was a sufferer from serious financial mismanagement, a heavy state debt being incurred, whose existence has ever since seriously impeded the progress of the state. The load eventually became so heavy that an act of repudiation was nearly carried by a popular vote, the alleged repudiable indebtedness amounting to about $11,000,000, while an admitted debt amounts to $5,000,000 more. No decision on this question has as yet been reached.—The report of the state auditor for 1891-2 showed total receipts $8,589,934.76; disbursements $6,354,133.27; balance $2,235,801.49. Assessed valuations were: (1880) $86,409,364; (1890) $174,737,755; (1892) $187,250,000. The total bonded debt 1892. Oct. 1, was: principal $1,931,100; interest due $2,978,332.50; total $4,909,432.50.—In 1892, Sep., there were 13 national banks (cap. $1,925,000); 44 state banks (cap. $2,561,662); 10 incorporated banks (cap. $294,900); 13 private banks.

Government.—The executive authority is vested by the constitution (1874) in a gov., elected for 2 years, salary $3,000 per annum; the legislative in a general assembly, comprising a senate of not less than 30 nor more than 35 members (32, 1890) elected for 4 years, and a house of

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representatives of not less than 73 nor more than 100 members (95, 1890) elected for 2 years, salary of each $6 per day; and the judicial in a supreme court of 3 judges, salary $3,000 each per annum, circuit courts for which one judge is elected in each judicial district, co. courts of one judge each, who is also judge of probate, courts of common pleas held by the co. judges at the direction of the general assembly, chancery court in Pulaski co., prosecuting atty. in each circuit, and justices of the peace. The gov. must be a citizen of the United States, at least 30 years of age, and must have resided in the state 7 years. In case of a tie vote for gov., choice is made by a joint vote of the general assembly. The constitution gives him power to veto any single item in an appropriation bill. In his death, absence, or disability, the pres. of the senate acts in his stead. All other members of the executive dept. are elected at the same time and in the same manner as the governor. The general assembly holds biennial sessions in odd-numbered years, meeting on the second Monday in Jan., and limited to 60 days. In case of disagreement between the two houses with respect to the time of adjournment, the gov. may adjourn them to such time as he may think proper, not beyond the day of the next meeting of the gen. assembly. Senators must be 25 years of age and have a state residence of 2 years, and representatives must be 21 years of age and have similar residence. Impeachments are to be preferred by the house and tried by the senate, the chief-justice presiding. All state officers are liable to impeachment, or may be removed by the gov. for cause upon the joint address of two-thirds of each house. Judges of the supreme court are elected for terms of 8 years; they must be 30 years of age and in practice 8 years prior to election. Judges of the circuit courts must be 28 years of age, and residents in the circuits. Where a circuit judge is absent or disqualified, the members of the bar may elect a temporary special judge, and when any supreme judge is disqualified to sit in any case, the gov. appoints a special judge to take his place. The sec. of state receives a salary of $1,800 per annum; treas. $2,250; auditor $2,250; atty.gen. $1,500; supt. public instruction $1,600; land commissioner $1,800; U. S. dist. judges (2) $1,000, $1,200; collector of internal revenue $2,750; and 10 deputy collectors $1,200—$1,500. The state govt. (1890) is democratic, with a party majority of 28 in the senate, 43 in the house, 71 on joint ballot. State elections are held biennially in even-numbered years, on the first Monday in Sep.; congressional and presidential elections Tuesday after first Monday in Nov. Indians, idiots, and persons convicted of crime are excluded from voting.

No co. or municipal corporation can become a stockholder in any company, or lend its credit to any such company; nor can it levy a tax exceeding ½ of 1 per cent. for all general purposes. No person who denies the being of a God can hold any office, or testify in any court.

The successive govs., with their terms of service, are as follows: *Terr.*: James Miller 1819–25; George Izard 1825–

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29; John Pope 1829–35; William S. Fulton 1835–6; *State:* James S. Conway 1836–40; Archibald Yell 1840–44; Samuel Adams (acting) 1844; Thomas S. Drew 1844–48; John S. Roane 1848–52; Elias N. Conway 1852–60; Henry M. Rector 1860–64; Isaac Murphy 1864–68; Powell Clayton 1868–71; Ozro A. Hadley (acting) 1871–2; Elisha Baxter 1872–75; Augustus H. Garland 1875–77; William R. Miller 1877–81; Thomas J. Churchill 1881–83; James H. Berry 1883–85; Simon P. Hughes 1885–89; James P. Eagle 1889–93; W. M. Fishback 1893–95.

Politics.—The state govt., 1893, was democratic in state officers and legislature, with a party majority in the latter of, senate 26, house 70, joint ballot 96.—A. has (1893) 8 electoral votes. Her votes for pres. and vice-pres. have been as follows: 1836, Martin Van Buren and Richard M. Johnson, 3; 1840, Martin Van Buren and Richard M. Johnson; 1844, James K. Polk and George M. Dallas; 1848, Lewis Cass and William O. Butler; 1852, Franklin Pierce and William R. King, 4; 1856, James Buchanan and John C. Breckinridge; 1860, John C. Breckinridge and Joseph Lane; 1864, no vote; 1868, Ulysses S. Grant and Schuyler Colfax, 5; 1872, 6 votes not counted; 1876, Samuel J. Tilden and Thomas A. Hendricks; 1880, Winfield S. Hancock and William H. English; 1884, Grover Cleveland and Thomas A. Hendricks, 7; 1888, Grover Cleveland and Allen G. Thurman; 1892, Grover Cleveland and Adlai E. Stevenson, 8.

Counties, Cities, and Towns.—A. is divided into 75 counties. In 1890 the most populous *counties* were: Pulaski 47,329; Jefferson 40,881; Sebastian 33,200; Washington 32,024; Benton 27,716; Phillips 25,341; White 22,946; Hempstead 22,796; Independence 21,961; Crawford 21,714; Clark 20,997; Logan 20,774; Franklin 19,934; Columbia 19,893; Conway 19,459; Lonoke 19,263; Lee 18,886; Faulkner 18,342; and Yell 18,015. The most populous *cities and towns* were: Little Rock 25,874; Fort Smith 11,311; Pine Bluff 9,952; Hot Springs 8,086; Helena 5,189; Eureka Springs 3,706; Texarkana 3,528 (2,852 additional in the part in Tex.); Fayetteville 2,942, and Camden 2,571.

Population.—(1820) white 12,579, free colored 77, slave 1,617, total 14,273; (1830) white 25,671, free colored 141, slave 4,576, total 30,388; (1840) white 77,174, free colored 465, slave 19,935, total 97,574: (1850) white 162,189; free colored 608, slave 47,100, total 209,897; (1860) white 324,191, free colored 144, slave 111,115, total 435,450; (1870) white 362,115, colored 122,169, total 484,471; (1880) white 591,531, colored 210,666, total 802,525; (1890) white 818,752, colored 309,427, total 1,128,179.

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ARKANSAS CITY: city in Cowley co., Kan., at the confluence of Walnut Creek with the Arkansas river; on the Atchison Topeka and Santa Fé, the St. Louis and San Francisco, and the Missouri Pacific railroads; 14 m. s. of Winfield, 250 m. s.w. of Kansas City. It has a city hall, 5 banks (3 national, 1 state, 1 private), 2 loan and investment cos., 2 daily and 3 weekly newspapers. There are manufactures of lumber, flour, chairs, mattresses, windmills, etc. It is in a stock-raising and grain-growing country, possesses water-power, and has an extensive trade with Indian Territory. Pop.(1880) 1,012; (1890) 8,347.

ARKANSAS RIVER: next to the Missouri the largest affluent of the Mississippi. It is 2,000 m. long, rising in the Rocky Mountains on the borders of Utah, and joining the 'Father of Waters' lat. 33° 54′ n., long. 91° 10′ w. Flowing generally through a level country, it presents few obstacles to navigation. The principal difficulty is connected with its periodical rise and fall—the difference between season and season being not less than 25 ft. Notwithstanding this, the A. is navigable for steamboats, during nine months of the year, 800 m. from its mouth. It divides the state which takes its name into nearly equal parts, varying in breadth within the limits of the same from 3 furlongs to half a mile. Its banks, in its lower course, contain much stone-coal.

ARKANSITE, n. *ärk'ăn-zīt* [from *Arkansas*, where it is found]: a mineral, a variety of Brookite. It occurs in thick black crystals.

ARK OF THE COVENANT, ARK OF THE TESTIMONY, or ARK OF JEHOVAH: one of the most important parts of the furniture of the Tabernacle which, by Divine direction, the Israelites constructed in the wilderness; and afterwards of the temple built by Solomon at Jerusalem. From Ex. xxv., xxxvii., it appears that it was a chest of shittim-wood (doubtless the wood of a species of acacia), overlaid with gold within and without, two cubits and a half in length, one cubit and a half in breadth and in height—that is, according to the common estimate of the length of the cubit, 3 ft. 9 in. in length, and 2 ft. 3 in. in breadth and height—the lid being formed entirely of pure gold, with a crown or raised border of gold round about. Within the ark was deposited the 'testimony,' consisting of 'the two tables of the law,' i.e., the stone tablets upon which the ten commandments were inscribed. The golden lid of the ark was called the *mercy-seat* or *propitiatory*, and above it were the *cherubim* (q.v.), made of the same piece of gold with it, and between them was the place of the *Shechinah* or manifestation of the Divine presence. The ark had also golden rings, through which passed staves of shittim-wood, overlaid with gold, for carrying it in the journeyings of the Israelites, concerning which very particular rules were laid down (see Numbers, iv.). While carried it was covered first with a 'covering of badgers' skins,' and above this with 'a cloth wholly of blue;' and in the tabernacle and temple it was put into the 'most holy place,' into which the high-priest

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alone was to enter upon the 'day of atonement.' The ark was called the A. of the C., because it was the appointed symbol of the presence of God as the God of Israel, and of his covenant with his people. The things of the Jewish dispensation being regarded as typical, and the Jewish religion as essentially one with the Christian, the ark is commonly regarded as a type of Christ; the excellency and unchangeableness of the moral law, as indicated by the place assigned to it within the ark, which, however, sprinkled with the blood of typical sacrifice, was interposed between it and men, who, having transgressed it, were exposed to its curse; and the mercy-seat, in like manner sprinkled with the blood of sacrifice, was interposed, as it were, between the law and God, who is represented in the Old Testament as 'dwelling between the cherubim,' and thence shining forth as the God of mercy, favorable to those that sought Him. A complete harmony is thus made out between these Old Testament types and the Christian facts.—It is worthy of notice, that sacred arks or chests have been connected with the worship of various heathen nations, and have been placed as the most sacred things in the innermost parts of the temple, which only the priests were permitted to enter. The relation of these to the ark of the Jews has been the subject of much learned inquiry, but has not yet received thorough elucidation.—The ark appears not to have been brought back from Babylon, and so never to have been in the second temple. No figure of it appears among the sacred vessels of the temple represented on the Arch of Titus.

ARKONA, *âr-kō'nâ:* n.c. promontory of the island of Rügen, in the Baltic, almost the most n. extremity of Germany. Its steep cliffs mainly consist of mixed chalk and loam, with horizontal veins of flint; there is a small deposit of pure chalk towards the east. Myriads of sand-martins build in the clefts of these cliffs. The view from their summit extends to the coast of Jasmund on the right, on the left to the islands of Hiddensöe and Möen. The name A. is very ancient. In the chronicles of Saxo Grammaticus we find it written Archona, but its derivation is quite uncertain. On the w. side is the famous wall or fortified inclosure in which stood the temple of the Wend deity Swantewit. King Waldemar I. of Denmark, after a bloody conflict, took possession of the fortress in 1168, burnt the idol and its temple, and carried away its treasures to Denmark. On its site, a lighthouse, 75 ft. high, was built in 1827.

ARKOSE, n. *âr'kōs* [Eng. *ark*]: a mineral compound formed of the same materials as granite, from the disintegration of which it has evidently been derived.

ARKSUTITE, n. *ârk'sō-tīt*, or ARK'SUDITE, *-dīt* [from *Arksut Fiord*, in s. Greenland]: mineral classed by Dana in his Cryolite group of fluorine compounds. It is a white, translucent, and brittle species, with vitreous lustre, except on cleavage faces, where it is pearly. Its composition is: fluorine, 51·03; alumina, 17·87; lime, 7·01; soda, 23·00; water 0·57. It has been proved to be Chiolite.

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ARKWRIGHT, *ärk'rīt*, SIR RICHARD: 1732, Dec. 23—1792; b. Preston, Lancashire: celebrated for inventions in cotton-spinning. Of humble origin, the youngest of thirteen children, and bred to the trade of a barber. his early opportunities were exceedingly limited. In 1760, he gave up his business as a barber in Bolton, and became a dealer in hair. A secret process for dyeing hair, said to have been discovered by himself, increased considerably the profits of his trade. Very little is known regarding the first movements of his mind in the direction of mechanical invention. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture. That the development of his mechanical ingenuity was not, however, due to circumstances, is proved by the fact that his first effort was an attempt to discover the perpetual motion. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767, he seems to have given his whole attention to inventions in cotton-spinning. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair moving slowly in contact, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. No previously invented machinery had been able to produce cotton thread of sufficient tenuity and strength to be used as warp. An invention, indeed, by Mr. Charles Wyatt, of Birmingham, which was patented in 1738, but never succeeded, deprives A. of the honor of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said, was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time A. was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. He soon removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Mr. Jedidiah Strutt, of Derby, the celebrated improver of the *stocking-frame*, who entered into partnership with him, in conjunction with his partner, Mr. Need. In 1769, A. set up his first mill, driven by horses, and took out a patent for his invention. In 1771, he set up a larger factory, with water-power, at Cromford, in Derbyshire. The remarkable capabilities of his mind were strikingly evinced in the management of the great business which now demanded his undivided attention. Without personal experience, and with no model to guide him, he introduced a system of management so admirable that it was afterwards universally adopted, and has never been materially improved. In 1775, he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade

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his patent; and to such an extent did other cotton-spinners use his designs, that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action against Colonel Mordaunt, backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that his description in his specification was not sufficiently clear and distinct. The other actions were abandoned; and, in the following year, A. published a pamphlet containing a statement of his case. In a new trial, in 1785, he obtained a favorable verdict. The whole question, however, was brought finally before the Court of King's Bench, a few months later, when A.'s claim to the inventions patented was for the first time called into dispute. On the doubtful evidence of a person named Highs, or Hayes, combined with that of A.'s old assistant, Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out A. as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against the man who abridged labor, but in reality increased its sphere; and on one occasion, a large factory belonging to A. was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. The energy and good sense of A., however, triumphed over all opposition; and at the time of his death, in 1792, the value of his property amounted to about half a million sterling. In 1786, he was appointed high-sheriff of Derbyshire; and on the occasion of presenting an address to the king, congratulating him on his escape from the knife of the maniac Margaret Nicholson, he received the well-merited honor of knighthood. A severe asthma had pressed upon him from his youth; and a complication of disorders, the result of his busy sedentary life, terminated his honorable career at the comparatively early age of sixty.—See SPINNING.

ARKYS, n. *ärk'ïs* [Gr. *arkus*, a net]: genus of spiders. The *A. lancier*, a native of S. Amer., is yellow with red at the sides.

ARLES, n. plu. *ärlz* or *ärlz* [Scotch: L. *arrha:* F. *arrhes:* It. *arra*, earnest money, a deposit: Gael. *earl*, provision, caution]: in *Scot.*, a piece of money given for confirming a bargain, as in hiring a servant; earnest-money. ARLE, v. *ärl*, to give a piece of money to a person to confirm a bargain. ARLING, imp. *är'ling*. ARLED, pp. *ärld*, hired by receiving arles.

ARLES, *ärlz* (anciently, *Arelate*): one of the oldest towns in France, on the left bank of the principal branch of the Rhone, after it has divided into a delta, in the dept. of Bouches du Rhone. A. has considerable trade. It manufactures silk, hats, tobacco, brandy, etc., and is a

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market for the productions of the surrounding country. It also possesses a college, a naval school, a public library, and a superb museum of antiquities in natural history. The marshes which long rendered the district unhealthy have been largely drained, and a canal has been formed which connects it with the s. coast. Railways also bring it into easy communication with Marseilles, Avignon, Nîmes, Montpellier, etc. Under the Romans, it was the seat of a prefect; afterwards the residence of the Gothic king, Eurich; and, 879, was the metropolis of the kingdom of Arelate. See BURGUNDY. In the early Christian times, important synods were convened here (314, 354, 452, and 475). Among the antiquities are a magnificent amphitheatre, which could contain between 20,000 and 30,000 spectators; the ruins of a palace of Constantine the Great; and a mediæval cathedral with a splendid portal arch. Pop. (1893) municipality, 24,288; town, 14,431.

ARLINGTON, *âr'ling-ton:* town in Middlesex co., Mass.; on the Boston and Maine railroad: 6 m. n.w. of Boston, with which it is connected also by horse-railroad. This pleasant and prosperous town has market-gardening and ice-cutting industries, 1 national and 1 savings bank, a weekly newspaper, several churches, a public library, and a number of manufacturing establishments. Pop. (1880) 3,906; (1890) 5,629.

ARM, v. *ârm* [F. *armer;* Sp. *armar*, to arm; F. *arme*, a weapon—from L. *armārĕ*, to arm—from *arma*, weapons of war]: to furnish with arms; to take up arms. ARM'ING, imp. ARMED, pp. *ârmd:* ADJ. *ârm'ĕd*, furnished with weapons; morally fortified; in *her.*, colored. ARM'LESS, a. without weapons. ARMS, n. plu. *ârmz*, weapons of war; state of hostility; war in general; signs armorial. ARMY, n. *âr'mĭ;* ARMIES, plu. *âr'mĭz* [F. *armée*]: a body of men armed for war; a host; a large number. FIREARMS, warlike weapons only effective with powder and shot, as distinguished from swords and lances. PASS or PASSAGE OF ARMS, a kind of combat with swords. STAND OF ARMS, a complete set of arms for one soldier. UNDER ARMS, in a state of immediate readiness for fighting. TO ARMS, a call or summons to engage in actual hostilities. SMALL-ARMS, those which can conveniently be carried by a soldier. TO THROW OR LAY DOWN ARMS, to surrender to an enemy by giving up arms. SIDE-ARMS, such arms as may be worn attached to the person, as sword, bayonet, etc. COATS OF ARMS, in *her.*, any signs or devices of heraldry painted or engraved, used as symbols of quality or distinction. ARMA, n. plu. *âr'mă*, in *bot.*, such appendages of plants as prickles and thorns. AR'MY-LIST, n. a published printed list of officers of the army. ARMING-BUCKLE, n. in *heraldry*, a lozenge-shaped buckle. ARMING-DOUBLET, n. a surcoat. ARMING-POINTS, n. pl. the fastenings keeping the several pieces of armor from separating. ARMING-PRESS, n. a press used in book-binding.

ARM, n. *ârm* [AS. *earm;* L. *armus*, the shoulder-joint,

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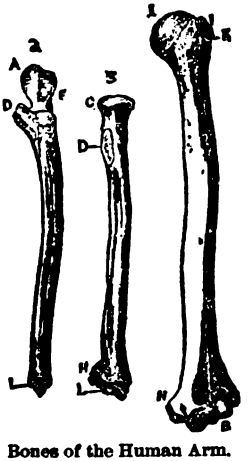
the arm: Icel. *armr*]: a limb of a body; a branch of a tree; inlet of the sea. ARMFUL, n. *ärm'fool*, as much as an arm can embrace when bent in towards the breast. ARMHOLE, n. *ärm'hōl*, Prov. and OE., the arm pit; the hole in a garment for the arm. ARM'-LIKE, a. *-līk*, of the form or appearance of an arm. ARM'LESS, a. without arms. ARM'LET, n. a little arm; a bracelet. ARM-CHAIR, n. a chair with arms to support the elbows. ARM'-PIT, n. the cavity under the shoulder. FORE-ARM, n. the part of the arm lying between the elbow and the wrist. ARM OF THE SEA, a part which runs far into the land. ARM'S-LENGTH, n. the length of the arm: ADJ. at a distance. ARMS-END, n. the end of the arms; a good distance off. ARM-SHAPED, a. shaped like the arm. ARM'S-REACH, n. the distance to which the arm can reach. ARM-IN-ARM, or ARM-AND-ARM, ad. or a. with one's arm interlocked in that of another.

ARM: the upper extremity of the human body; consisting of two portions—the A., strictly so called, and the forearm; the former having one bone, the humerus (1), which moves freely by a globular head upon the scapula, forming the shoulder-joint; and the latter having two bones, the radius (3) and ulna (2), which move on the lower end of the humerus, forming the elbow-joint, and below with the carpus forming the wrist.



Bones of the Human Arm.

The humerus is attached by a loose capsular ligament to the scapula, allowing great freedom of motion; and were it not for the muscles passing into I and K, would be frequently dislocated, but it is supported by these muscles on all sides except underneath or opposite the armpit, into which the head of the bone is often driven. The roundness of the shoulder is due to the head of the humerus, so that any displacement is accompanied by a flattening, which at once suggests the nature of the accident. On the shoulder is a large triangular muscle, the deltoid, which lifts the A. from the side. At the back is the triceps, which extends the forearm; in front are two muscles which flex or bend it—the biceps, and the brachialis anticus; and on each side below are muscles passing to the forearm and hand; while on each side above, the great muscle of the back (latissimus dorsi) and that of the chest (the pectoralis major) are inserted on each side of a groove, wherein lies one of the tendons of the biceps (q.v.) The motions of the ulna are flexion or bending effected by the biceps, and extension or straightening by the great exten-

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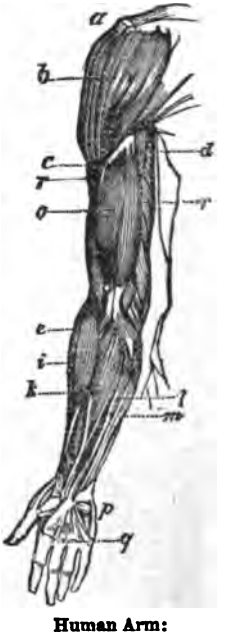
sor muscle, the triceps, its projections, D and A, being received in these movements into corresponding depressions on the humerus. The movements of the hand are principally due to the radius, the head of which rolls at C and H upon the ulna at F and L, thereby turning the palm downwards (pronation), or restoring the palm upwards (supination), these movements being effected by muscles, two for each movement, which, taking their fixed points from the humerus and ulna, pull the radius round on the latter. The elbow-joint is ginglymoid or hinge-like, and therefore has strong lateral ligaments; but it is extremely liable to dislocations, often accompanied by fracture, especially in the young. The accident being followed by severe inflammation, the joint is very apt to stiffen, thereby seriously (see ANCHYLOSIS) deteriorating from the usefulness of the limb; it is, therefore, unadvisable to keep the limb too long in any one position after such an injury. This joint is also very liable to disease; but as this is confined to the ends of the bones, the small portions of the latter affected can be readily cut out, and the arm be restored to usefulness and mobility in a few weeks.



Human Arm:
abc, deltoid muscle; *d*, coraco brachialis muscle; *r*, *r*, triceps; *e*, *i*, extensors of wrist and long supinator of the hand; *km*, flexor of fingers and radial and ulnar sides of the wrist, and *l*, palm of the hand, or palmaris longus; *p*, palmaris brevis; *q*, palmar fascia; *o*, biceps.

The upper extremity is supplied with blood by the brachial artery, the continuation of the axillary trunk. The veins collect into large superficial trunks, which unite at the bend of the elbow, at which situation one is frequently selected for venesection, and then pass on to the axillary, on the outside by the cephalic vein, on the inner side by the basilic.

The nerves pass down as large cords by the side of the artery, and diverge from it to their ultimate distributions; the musculo-spiral soon passing round at the back to appear on the outside, and become the radial and posterior interosseous nerves; the ulna running behind the internal condyle, N., (Fig. 1), for which it has obtained the term 'funny bone,' from the electric-like thrill which passes along the arm when the nerve is struck or pressed. The

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median, as its name implies, keeps a middle course with the artery.

In wounds of the forearm, the bleeding is often excessive but may be at once controlled by pressure on the brachial artery, on the inner side of the biceps.

The arm affords excellent illustrations of some of the principles of mechanics. The insertion of the muscles so near, as will be seen, to the fulcra or centres of motion, involves a loss of power in the usual sense of the word; there is, however, a corresponding gain in velocity at the end of the lever; and for most of the purposes to which the hand is put, agility is of far greater moment than dead strength.

ARM: in maritime language (besides the obvious application to weapons of warfare), a term applied to each extremity of a bibb, or bracket, attached to the mast of a ship for supporting the trestle-trees. The same name is also given to a part of the anchor. See ANCHOR.—In military language, the infantry, the cavalry, the artillery, and the engineers are each called 'an A.' of the service—equivalent to branch or department.

ARMADA, n. *âr-mä'dä* [Sp. *armada*, the fleet, the navy —from *armar*, to arm—from L. *armārĕ*, to equip with arms; *armātŭ*, armed]: a fleet of war-ships; especially the great Spanish fleet of war-ships which attempted the invasion of England in the reign of Elizabeth, 1588. The king of Spain, Philip II., had resolved to strike a decisive blow at the Protestant interest, by conquering England, which Pope Sixtus V. had made over to him. The ports of Spain, Portugal, and other maritime dominions belonging to him had long resounded with the noise of his preparations, and the most eminent Rom. Cath. soldiers from all parts of Europe flocked to take a share in the expedition. The Marquis of Santa-Croce, a sea-officer of great reputation and experience, was selected to command the fleet, which consisted of 130 vessels, of greater size than any hitherto seen in Europe. The Duke of Parma was to conduct the land-forces, 20,000 of whom were on board the ships of war, and 34,000 more were assembled in the Netherlands, ready to be transported into England; so that, as no doubt was entertained of success, the fleet was ostentatiously styled the Invincible A. Nothing could exceed the terror and consternation which seized all ranks of people in England upon the news of this terrible A. being under sail to invade them. A squadron of not more than thirty ships of the line, and those very small in comparison, was all that Elizabeth had to oppose it by sea; and it was considered impossible to make any effectual resistance by land, as the Spanish army was composed of men well disciplined and long inured to danger. But although the English fleet was much inferior in number and size of shipping to that of the enemy, it was much more manageable, while the dexterity and courage of the mariners were greatly superior. Lord Howard of Effingham, a man of

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great valor and capacity, took upon him, as lord high admiral, the command of the navy; Drake, Hawkins, and Frobisher, the most renowned seamen in Europe, served under him; while another squadron, consisting of forty vessels, English and Flemish, commanded by Lord Seymour, lay off Dunkirk, in order to intercept the Duke of Parma. Such was the preparation made by the English; while all the Protestant powers of Europe regarded this enterprise as the critical event which was to decide forever the fate of their religion. Meantime, while the Spanish A. was preparing to sail, the admiral, Santa-Croce, died, as likewise the vice-admiral, Paliano; and the command of the expedition was given to the Duke of Medina Sidonia, a person utterly inexperienced in sea affairs; these unexpected circumstances served, in some measure, to frustrate the design. Some other accidents also contributed to its failure. Upon leaving the port of Lisbon, the A. next day met a violent tempest, which sank some of the smallest of the ships, and obliged the rest to put back into the harbor. After some time spent in refitting, the Spaniards again put to sea, where they took a fisherman, who gave them intelligence that the English fleet, hearing of the dispersion of the A. in a storm, had returned to Plymouth, and that most of the mariners were discharged. From this false intelligence, the Spanish admiral, instead of going to the coast of Flanders, to take in the troops stationed there, resolved to sail directly to Plymouth, and destroy the shipping laid up in the harbor. But Effingham was very well prepared to receive him, and had just left port, when he saw the Spanish A. coming full sail towards him, disposed in the form of a half-moon, and stretching seven miles from one extremity to the other. The English admiral, seconded by Drake, Hawkins, and Frobisher, attacked the Spaniards at a distance, pouring in their broadsides with admirable dexterity. They did not choose to engage the enemy more closely, because they were greatly inferior in number of ships and guns, as well as in weight of metal; nor could they attempt to board such lofty vessels without manifest disadvantage. In this action, however, two Spanish galleons were disabled and taken. As the A. advanced up the Channel, the English still followed and infested its rear; and as their ships continually increased from different ports, they soon found themselves in a capacity to attack the Spanish fleet more nearly, and accordingly fell upon them while they were taking shelter in the port of Calais. To increase their confusion, Howard selected eight of his smaller vessels, which, after filling them with combustible materials, he sent one after another, as if they had been fire-ships, into the midst of the enemy. The Spaniards, taking them for what they seemed to be, immediately bore off in great disorder; while the English, profiting by their panic, captured or destroyed about twelve ships. The Duke of Medina Sidonia being thus driven to the coast of Zealand, held a council of war, in which it was resolved that, as their ammunition began to fail, as their fleet had

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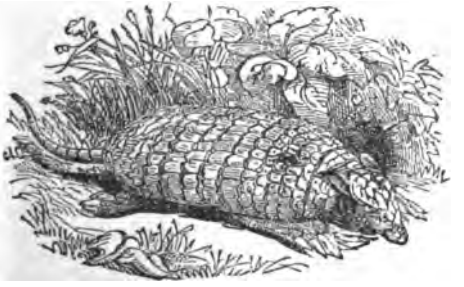
received great damage, and as the Duke of Parma had refused to venture his army under their protection, they should return to Spain, by sailing round the Orkneys, as the winds were contrary to their passage directly back. Accordingly, they proceeded northward, and were followed by the English fleet as far as Flamborough Head, where they were terribly shattered by a storm. Seventeen of the ships, having 5,000 men on board, were afterwards cast away on the Western Isles and the coast of Ireland. Of the whole A., fifty-three ships only returned to Spain, and these in a wretched condition. The seamen, as well as the soldiers who remained, were so overcome with hardships and fatigue, and so dispirited by their discomfiture, that they filled all Spain with accounts of the desperate valor of the English, and of the tempestuous violence of that ocean by which they were surrounded.

ARMADILLO, n. *ăr'mă-dĭl'lō* [Sp. dim. of *armádo*, a man in armor—from L. *arma*, arms, from its scaly covering] (*Dasypus*): genus of *Mammalia* of the order *Edentata* (i. e., toothless)—not, however, truly toothless, but having feeble teeth destitute of true roots, and set apart from each other, and so that those of the one jaw fit into the interstices of those of the other. The number of the teeth is different in different species. The muzzle is elongated, and the tongue smooth and slender, with a glutinous saliva, adapted to the capture of ants and other



Armadillo.

insects, after the manner of the ant-eaters, but not long and extensile, like theirs. The limbs are short and strong, as are also the claws, and the animals have a great aptitude for digging and burrowing, by means of which they seek to shelter themselves from enemies—burrowing in sand or soft earth with such rapidity that it is almost impossible to dig them out, and indeed it can only be done by persevering till they are exhausted. But that which peculiarly distinguishes the A., and in which this genus differs from all the other mammalia, except the *Chlamyphorus* (q.v.), is the bony armor with which the body is covered, and which consists of polygonal plates not articulated, united on the head to form a solid covering, and similarly to form

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solid bucklers over the shoulders and the haunches; and between these, disposed in transverse bands, which allow of freedom of motion to the body, similar bands, in most species, protecting also the tail. Within these plates the animal is able to roll itself up like a hedgehog. Armadillos feed not only on insects, but on vegetable and animal food of almost every kind, which by decomposition or otherwise has acquired a sufficient softness. Some of them prefer vegetable food, others delight chiefly in carrion. They are all natives of the warm and temperate parts of South America, in the woods and pampas of which they are found in immense numbers. They are timid and inoffensive, although, when they are incautiously assailed, injury may be received from their claws. Their flesh is esteemed a delicacy, particularly that of the species which feed chiefly on vegetable food. The largest species is fully three ft. long, exclusive of the tail; the smallest, not above ten inches. The species are numerous, and the genus has been divided into a number of sub-genera, which some naturalists elevate into genera, naming the family *Loricata* (i. e., mailed). To this family belongs also the genus *Chlamyphorus*, also South American. Fossil remains of gigantic extinct armadillos have been found in the pleistocene strata of South America, forming the genus *Glyptodon* of Owen, so named from the fluted teeth.

ARMADIL'LO: scientific name of a genus of *Crustacea* of the order *Isopoda* of Cuvier. This is one of the genera usually included under the popular name of Woodlouse, and one of which (*Porcellio*) is very generally known by that of Slater. The armadillos derive their name from the scaly armor of their body, in which an analogy is found to the mailed quadrupeds of South America. These little creatures have, in a remarkable degree, the power of rolling themselves into a ball, when alarmed, so as to expose nothing but the plates of the back, and have thence received the name of Pill Beetles. Like some of the other closely allied *Isopoda*, they were at one time reputed to possess medicinal virtues, now accounted merely imaginary. They were not only used in a dried and pulverized state, but they are said to have been actually swallowed entire as pills. The *Isopoda* are now made a sub-order of *Tetradecapoda* (fourteen-footed).

ARMAGH, *âr-mâ':* a small inland county in Ulster, Ireland, bounded n. by Lough Neagh, e. by Down, s. by Louth, w. by Monaghan and Tyrone: greatest length 32 m., and breadth 20; 512½ sq. m., about four-fifths being arable, and a 36th part in woods. The surface is hilly in the s., and undulating in the centre, attaining in Slieve Gullion, in the s.w., the height of 1,893 ft. The other chief heights are the Newry Mountains, 1,385 ft.; the Armagh-breague Hills, 1,200; and Mullyash, 1,034. The country bordering upon Lough Neagh is low and boggy, and the Louth plain extends into the s. end of A. The principal rivers, navigable in their lower parts, are the Upper Bann, flowing out of Down n.w. 11 m. before it

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enters Lough Neagh; and the Blackwater, which, in its lower part, separates A. from Monaghan. The rocks of A. are—Lower Silurian in the s. and middle of the county; the trap of Antrim, with the underlying greensand, around Portadown; carboniferous limestone in the basins of the Blackwater, and its tributary the Callan; granite in the mountains of the s.e.; and tertiary strata bordering Lough Neagh. The soil is fertile except in the southern extremities. In 1880, 163,236 acres were in crop, the principal crops being oats, potatoes, wheat, turnips, and flax. The stock in that year was 13,815 horses, 79,474 cattle, 9,125 sheep, 15,136 pigs. The n. and central parts of A. have a dense population, and contain low hills cultivated to the tops, hedgerows, orchards, and thickly-scattered farm-steadings. The county is mostly in the diocese of Armagh. It returns three members of parliament. The chief towns are A., Lurgan, Portadown, and Newry (which, however, is mostly in Down). Pop. (1871) 179,260; (1881) 163,177; of whom about half are Rom. Cath., while of the remainder, the Episcopalians greatly outnumber the Presbyterians (1891) 143,289.

ARMAGH: capital of the county of A., in a carboniferous limestone district, in the n.w. of the county. It is situated around and on a gentle eminence, hence its original name, Ard-Magha, 'the high field.' It is built of limestone. The cathedral, of red sandstone, is cruciform—184 by 119 ft.—and is supposed to occupy the site of that erected by St. Patrick in the 5th c. It has had extensive repairs, chiefly at the cost (£10,000) of the late lord primate, John George Beresford. A Gothic Rom. Cath. cathedral occupies the principal height to the n., and the primatial palace that to the s. There is a fever hospital for forty patients, maintained by the late primate, and a lunatic asylum for four counties. A. is the seat of the archiepiscopal see of the primate and metropolitan of all Ireland, who, before the disestablishment of the Irish Church, had an income of £12,087 a year. The chief manufacture is linen-weaving. A., from the year 495 to the 9th c., was the metropolis of Ireland, the native kings living at Eamania, 2 m. to the w. of the city. It was then renowned as a school of theology and literature—its college being the first in Europe. After the Reformation, it suffered severely in the conflicts between the English and Irish; and it contained only three slated houses in 1765. Pop. (1871) 8,946; of whom 4,691 were Rom. Cath., 3,020 Episcopalians, 918 Presbyterians. In 1891, it was 8,303.

ARMAGNAC, *âr-mân-yâk'* (*Ager Aremonicus*): old name of a district in the s. of France, which at one time seems to have extended from the valleys of the Pyrenees to the Garonne. It is now included in the departments of Hautes Pyrénées and Gers. The remarkably fertile land, producing grain and the best descriptions of wine, and also favorable for pasturage, is cut up into an extraordinary number of small estates, and divided among numerous petty proprietors. The principal branch of trade is the

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distillation of the brandy known in commerce as *Eau d'Armagnac*, which rivals those of Cognac and Saintonge. The ancient capital is Lectoure, on the river Gers, with about 3,000 inhabitants. To the s. of it lies Auch, the chief town of the department of Gers. Pop. about 12,000. The people are noted for their simplicity, strength, and bravery; but are extremely credulous and ignorant. Formerly, their services were highly valued in times of war. The A. family, descended from the old Merovingian king. Clovis, was important in French history.

ARMAGNAC, BERNARD VII., Count D': leader of the 'Armagnacs' in their civil war with the Burgundians, and afterwards chief minister and constable of France unde. Queen Isabeau. His unscrupulous and tyrannical measures made him odious to the people, and in 1418, when Paris was taken by the Burgundians, he and a large number of his followers were massacred.

ARMAGNAC, JEAN V., Count D': b. abt. 1420: grandson of Bernard. He was excommunicated by the pope for marrying his own sister, who had been engaged to Henry VI. of England. He joined the League of the Public Good against Louis XI. of France, through which he lost his estates, but they were restored to him. He was put to death by the king's troops in 1473.

ARMAMENT, n. *âr'mă-mĕnt* [L. *armamen'ta*, implements, utensils—from *arma*, weapons of war]: a land or naval force fitted out for war. Also, all the weapons collectively employed in sea and land battles, are called the A. of a ship or of an army.

ARMAN, n. *âr'mân:* a confection for restoring appetite in horses.

ARMAND, *âr-mŏn'*, CHARLES, Marquis de la Rouarie, *deh lá ró-á-re':* 1756–93: French soldier who volunteered in the American army during the Revolutionary war, and rose to the rank of brig.gen. He afterwards took part in the French Revolution, on the royalist side, serving in Brittany and Anjou.

ARMANSPERG, *âr'mân-spĕrg'*, JOSEPH LUDWIG, Count of: 1787–1853; b. in Lower Bavaria: formerly president of the government in Greece. He early began an administrative and diplomatic career. On the accession of King Louis to the throne, A., who had already occupied several important posts, was summoned to Munich, where, rapidly rising from one dignity to another, he at length became minister of finance and of foreign affairs. In both capacities he proved active and successful; but he drew upon himself the hatred of the Camarilla by his strenuous opposition to the claims of Rome, as well as by his attempts to identify himself with the decidedly liberal party. The consequence was that, in 1831, he lost his post, and in the same year was appointed ambassador to London, but preferred retiring to his family estate. However, he could not resist the king's repeated request that he would undertake the formation of his son's government in Greece; and

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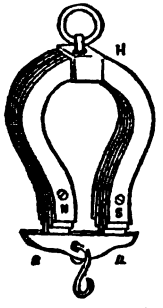
accordingly, accompanying young King Otho, A. landed at Nauplia, 1833, Jan. For four years he was at the head of public affairs, and Greece derived many benefits from his administration; but the heat of party strife and court intrigues led to his dismissal, and he left Greece, 1837, March, retiring to his estate near Deggendorf.

ARMATO'LES: a body of Greek militia, first formed under the reign of Sultan Selim I. about the beginning of the 16th c. They were intended to preserve the fertile plains from the ravages of the *Klephts* (mountain robbers of Thessaly) who had never been entirely conquered by the Turks. The A. themselves were originally Klephts, but received their more honorable designation when the Porte had metamorphosed them into a sort of military police. The safety of the public roads was intrusted to their care. The whole of Northern Greece was divided into sixteen districts (*capitaineries*), each placed under the supervision of a chief of these militia, who, however, had himself to receive orders from a Turkish pasha or Greek bishop. But although the A. frequently suppressed the brigandage of the Klephts, they still regarded them in the light of brothers, inasmuch as they had a common origin and faith; both detested the oppressors of their country; and the sentiment of patriotism overruled every other consideration. This sympathy at last appeared to the Turks so dangerous that they grew alarmed, and desired to substitute for the A. the Mohammedan Albanians, who were the implacable enemies of the Greeks, which resolution did not a little to hasten the insurrection which the Porte ever dreaded. The moment it broke out, the A. pronounced themselves in favor of the national cause, and in the war of independence that ensued distinguished themselves by their brilliant exploits.

ARMATURE, n. *ăr'mă-tūr* [F. *armature*, brace, fencing: L. *armātūra*, armor, equipment—from *arma*, arms]: pieces of soft iron placed at the extremities or poles of magnets to preserve their magnetic power. When magnets are allowed to remain any length of time without such appendages, in consequence of the disturbing influence of terrestrial magnetism they lose considerably in strength; but when they are provided with them their magnetism is kept in a state of constant activity, and thereby shielded from this disturbance. The reason of this is found in two facts well known in the science of magnetism —viz., that when a piece of soft iron is brought into contact with the extremity of a magnet, it is itself induced to become magnetic; and that the unlike poles of two different magnets powerfully attract each other. Referring to the figure, the north pole, N, of the horseshoe magnet, NHS, acting on the armature, *sn*, induces it to become a magnet, having its



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south pole, *s*, next to N, and its north pole, *n*, at the opposite extremity. The pole, S, by virtue of its magnetic affinity, powerfully attracts the north pole, *n*, thus formed, and adds its own inducing influence to heighten the magnetic condition previously induced in the armature by the pole N. The A., from the combined action of both poles of the horseshoe magnet, is thus converted into a powerful magnet, with its poles lying in an opposite direction to that of the primary poles. The original magnet is, in consequence, brought into contact with one of its own making, the exact counterpart of itself—a condition highly favorable to the maintenance of its strength. It is due to the same mutual attractions that a much larger weight can be suspended from the A. thus placed, than the single poles can together sustain. Bar magnets may be armed in the same way by laying them at some distance parallel to each other, with their unlike poles towards the same parts, and then connecting their extremities by two pieces of soft iron. When a magnet, such as a compass-needle, is free to take up the position required by the magnetism of the earth, the earth itself plays the part of an armature.

ARMATURE, in Botany: the hairs, prickles, etc., covering an organ.

ARMED VESSEL: distinguished from a man-of-war by the temporary period of its employment, being a merchant ship in the service of a govt. for a specified time and purpose, armed and equipped in accordance with the requirements of the case. Thus privateers and letters-of-marque are included under this head; so in Great Britain are certain lines of royal mail steamers, which can be placed in commission in time of war; and the same was the case during the American civil war, when many freight and passenger steamers were employed as transports and for other important naval uses; notably the *Vanderbilt* and the *Star of the West*. In 1892 arrangements were effected through an act of congress for the building (or transfer) of a number of trans-Atlantic passenger steamers—some being of the largest class and highest speed—which should receive American registration, on the condition that they should be at the service of the U. S. govt. as naval vessels in time of war.

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ARMENIA, *ăr-mē'nĭ-a:* a high table-land on the s. slope of the Caucasus, stretching down towards Mesopotamia. It has had different boundaries in the various centuries of its history. It is the original seat of one of the oldest civilized peoples in the world, the Armenians, who belong to the Indo-Germanic family of nations. Their oldest records contain nothing certain beyond the facts that, in ancient times, they were governed by independent kings, but afterwards became tributary to the Assyrians and Medes. That dim period which wavers between myth and history begins, in the case of A., about the middle of the 6th c. B.C., when King Dikran, or Tigranes I. of the Haig dynasty, restored the independence of the kingdom. The last king of this dynasty was slain in battle against Alexander the Great, who conquered the country. After Alexander's death, A. passed through several changes of fortune under the Seleucidæ, who appointed governors over it. Of these, two—Artaxias and Zariadres—made themselves independent of their sovereign, Antiochus the Great, while he was engaged in his contest with the Romans, B.C. 223–190. They divided the province into two districts—Artaxias taking A. Major (that part of the country lying e. of the Euphrates), and Zariadres A. Minor (the part to the w. of that river). The dynasty of Artaxias did not reign long; for about the middle of the 2d c. B.C., we find A. Major in the possession of a branch of the Parthian Arsacidæ, of which the most powerful king was Tigranes the Great, who added to the conquests made by his predecessors in Lower Asia and the region of the Caucasus, Syria, Cappadocia, and A. Minor; defeated the Parthians, and took from them Mesopotamia and other countries. He lost all these territories by his war with the Romans, into which he was led by his father-in-law Mithridates, king of Pontus, B.C. 63. After this, the assaults of the Romans from the w., ever growing more and more vigorous, and those of the Parthians from the e., hastened the downfall of A. Major. The successors of Tigranes became dependent, partly on one nation, partly on the other, while internally the nobles broke through the restraints of a feeble monarchy, and claimed the privileges of petty kings. Under Trajan, A. Major was for a short time a Roman province. Its subsequent history exhibited an unbroken series of tumults and wars, of violent successions to the throne, despotic reigns, and rapid decay. In A.D. 232, the province was conquered by the Sassanides, who held possession of it 28 years, until Tiridates III., the rightful heir, was restored to the throne by Roman assistance.

About this time Christianity became the religion of A., which was thus the first nation to embrace the new religion. Tiridates himself had been converted by St. Gregory the Illuminator as early as about 300. The old religion of Armenia had for its basis the doctrines of Zoroaster, with a curious intermixture of Greek mythology and of ideas peculiar to the country. It is certain that the Armenians worshipped as their mightiest gods Aramazt and Mihir

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(the Ormuzd and Mithras of the old Persians); but they had also a kind of Venus, whom they styled Anaitis, and several other deities, to whom they offered animal sacrifices. This change of creed, however, made no improvement in the political circumstances of the falling state. The Byzantine Greeks on one side, and the Persians on the other, regarded A. as their prey; and in 428, Bahram V. of Persia made A. a province of the empire of the Sassanides, and with the deposition of Artasir the dynasty of the Arsacidæ was brought to a close. The rule of the Sassanides in A. was marked chiefly by their sanguinary but unsuccessful attempts to extirpate Christianity. In 632, the unhappy country was subjected to another form of despotism under the Arabian caliphs, and suffered terribly during their contest with the Byzantine emperors. In 885, Aschod I., of an old and powerful Armenian family, ascended the throne, with the permission of the caliphs, and founded the third Armenian dynasty—that of the Bagratidæ. Under them A. was prosperous till the 11th c., when divisions and internal strife began to weaken the country; till at length the Greeks, having murdered the last monarch of the Bagratidæ, seized a part of the kingdom, while the Turks and Kurds made themselves masters of the rest—only one or two of the native princes maintaining a perilous independence. In 1242, the whole of A. Major was conquered by the Mongols, and in 1472 became a Persian province. Afterwards the w. part fell into the hands of the Turkish sultan, Selim II.

The fate of A. Minor was hardly better. The dynasty founded by Zariadres prevailed to the time of Tigranes the Great, sovereign of A. Major, who conquered the country about B.C. 70. Afterwards A. Minor was subjugated by the Romans, and made a Roman province. On the division of the empire into eastern and western, it became attached to the former, and shared in all its changes of fortune until near the close of the 11th c. At this time A. Minor—which had long been a place of refuge for many who had fled from the rage of the Turks and Persians in the sister province—was again raised to independence by Rhupen (a refugee from A. Major, and descendant of the Bagratidæ). His successors extended their dominion over Cilicia and Cappadocia, and were prominent in the Crusades. This dynasty ruled prosperously until 1374, when A. Minor was conquered by the Egyptian sultan Schaban. Since that time A., with the exception of the parts which Russia has won in the present century from Persia, and which are better governed, has remained subject to the despotism of the Turks and Persians. Notwithstanding this, the Armenians have steadily preserved their nationality, both in its physical and moral lineaments; their faith, and even—though only a relic of their ancient culture—a higher civilization than their conquerors. The political storms which devastated the country during the middle ages, and the persecutions of the Turks, have driven many of the inhabitants from their homes. This is the reason why we find them scattered over all Asia and Europe and in recent years in the United States. In Hungary,

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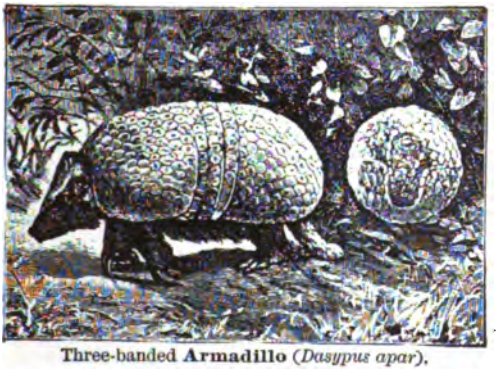

Three-banded **Armadillo** (*Dasypus apar*).

Armed at all points.—From Tower of London.

Armilausa, from an illumination of 14th century.

Armet-grand.

Armet-petit.

Armet.

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Transylvania, and Galicia they number 10,000. They are very numerous in Russia, but most of all in Asia Minor, and in the neighborhood of Constantinople, where they number 200,000.

The greater part of A. is an elevated table-land. Its area is estimated at 90,000 sq. m.; pop. about 2,000,000. It is watered by the rivers Kur, Aras, Joruk, Euphrates, and to a slight extent by the Tigris. The lakes which lie within this mountainous region are Van, Urumiyah, and Sevan. The Armenian plateau, on the e. side of which the volcanic range of Ararat lifts itself, forms the central point of several mountain-chains, such as Taurus and Antitaurus, the mountains of Kurdistan, and those which run n. to the Black Sea. It shows many traces of volcanic agency, and even yet—as was shown by the severe earthquake of the summer of 1840, and by the total destruction of Erzroum in 1859—has an internal volcanic activity. The climate in the higher regions is hot in summer and cold in winter, but in the valleys it is more temperate. The country labors under a great scarcity of wood, and in some parts is sterile, through a deficiency of water; in other parts the soil is extremely fertile, producing rice, hemp, flax, tobacco, wine, cotton, and many varieties of fruit. Cattle breeding and grazing are more extensive than agriculture. The mountains contain iron, copper, lead, salt, and naphtha. The number of the inhabitants of pure Armenian origin is reckoned at nearly 1,000-000, but there is a large admixture of Turkomans, Greeks, Jews, Kurds, etc. The Armenians belong physically to the finest variety of the Indo-Germanic race. Their intellectual capacity is also remarkable, as is shown both by their literature and their singular dexterity in business. Still, long centuries of oppression have exerted a withering influence on their native strength of character. The n.e. portion of A., about one-third of the whole, was wrested from Persia in 1828, and is under the Russian sceptre. About a sixth part to the s.e. still belongs to Persia. The w. portion, comprising two-thirds of the Armenian area, is Turkish. After the war of 1877–78 between Russia and Turkey, the Berlin Conference sanctioned the cession to Russia of a strip of A., including Kars and Ardahan; and the sultan engaged to carry out in A. much-needed reforms, guarantee the Armenians security against the Circassians and Kurds, and undertook to report to the European powers the measures adopted. Pop. of A. abt. 2,000,000.

ARMENIAN, a. *âr-mē'nĭ-ăn:* pertaining to the country of *Armenia;* denoting a stone found in Armenia: n. an inhabitant. ARMENIUM, n. *âr-mē'nĭ-ŭm*, a pigment of the ancients, produced by grinding the Armenian stone, a supposed blue carbonate of copper, combined with lime. ARMENIAN WHETSTONE, in *min.*, Dana's rendering of the Greek name given by Theophrastus to emery.

ARME'NIAN CHURCH: probably established as early as the 2nd c., at the introduction of Christianity into Armenia, was not firmly established till about the end of the 3d c., when the apostolical exertions of Bishop Gregory (q.v.),

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converted Tiridates. See ARMENIA. The Bible was translated into the Armenian language in the 5th c. After this period great animation characterized the A. C. Numbers flocked to the colleges at Athens and Constantinople. In the ecclesiastical controversy concerning the twofold nature of Christ, the Armenian Christians held with the Monophysites (q.v.); refused to acknowledge the authority of the Council of Chalcedon; and constituted themselves a separate church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself among them to a far wider extent than in the other eastern churches. Their greatest divine is Nerses of Klah, belonging to the 12th c., whose works have been repeatedly published. The most recent edition was issued in Venice, 1833. The Gregorians have continued to entertain a deeply rooted aversion to the so called orthodox church. The Rom. Cath. pope at various times, especially (1145, 1341, 1440) when the Armenians accepted the help of the West against the Mohammedans, tried to persuade them to recognize the papal supremacy; but for the most part only the nobles consented to do so, while the mass of the people clung to their peculiar opinions, as we see from the complaint of Pope Benedict XII., who accuses the A. C. of 117 errors of doctrine. There is a sect of *United Armenians* in Italy, Poland, Galicia, Persia, Russia, and Marseilles. Since the formation of this body in 1835, vigorous and constant attempts, succored especially by French influence, have been made to secure the acknowledgment of the pope as the head of the Rom. Cath. portion of the A. C. When this end seemed nearer attainment than ever before, the ultramontane utterances of their representative, Mgr. Hassun, at the Ecumenical Council at Rome, 1870, in favor of infallibility, created such a reaction at home as has greatly strengthened for the present the cause of the old Gregorian party. The recent humiliation of France has further weakened the cause of the propapal party. In theology the A. C. attributes only *one* nature to Christ, and holds that the Holy Spirit proceeds from the Father alone; the latter doctrine, however, being held by it in common with the 'orthodox Greek Church,' although contrary to the theology of the western churches. With respect to the 'seven sacraments,' it entertains the peculiar notions that at baptism one must be sprinkled three times, and as often dipped; that confirmation is to be conjoined with baptism; that the Lord's Supper must be celebrated with pure wine and leavened bread; that the latter, before being handed round, must be dipped in the former; and that extreme unction is to be administered to ecclesiastics alone, and that immediately after (instead of before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek Church in the number of its fasts, but has fewer religious festivals. These, however, are more enthusiastically kept. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is carried on in the new Its sacerdotal constitution differs little from the Greek. The head of the

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church, whose title is Catholikos, resides at Etshmiadzin, a monastery near Erivan, the capital of Russian Armenia. To this place every Armenian must make a pilgrimage once in his life. The monks of this church follow the rule of St. Basil. The Wartabieds form a peculiar class of ecclesiastics; they live like monks, but are devoted exclusively to learning. Secular priests must marry once, but none are at liberty to take a second wife. Missionaries from the evangelical churches in the United States have had much success among the Armenians in gathering churches, and establishing schools and colleges.

ARME'NIAN LITERATURE: previous to the introduction of Christianity by Gregory (A.D. 300), the Armenians had adhered to the Assyrian or Medo-Persian system of culture; but excepting a few old songs or ballads, no remains of that early period exist. After their conversion to Christianity, the Greek language and its literature soon became favorite objects of study, and many Greek authors were translated into Armenian. (See Wenrich *De Auctorum Græcorum versionibus Arabicis, Armeniacis*, etc. Leipzig, 1842.) The Armenian language has an alphabet of its own, consisting of 36 letters, introduced by Miesrob in 406. The most flourishing period of A. L. extends from the 4th to the 14th c. The numerous Armenian theological writers and chroniclers of this era supply materials for a history of the East during the middle ages which have hitherto been too much neglected. These Armenian writers generally copied the style of the later Greek and Byzantine authors; but in adherence to facts and good taste, they are superior to the general order of oriental historians. In the 14th c., literature began to decline, and few remarkable works were afterwards produced; but since the time of their dispersion, the Armenians have preserved recollections of their national literature; and wherever they are found—in Amsterdam, Lemberg, Leghorn, Venice, Astrakan, Moscow, Constantinople, Smyrna, Ispahan, Madras, or Calcutta—the printing-office is always a feature in their colonies. The most interesting Armenian settlement is that of the Mechitarists (q.v.), on the island of San Lazaro, near Venice.

The Bible translated into Armenian (the Old Testament from the text of the Septuagint) by Meisrob and his scholars is esteemed the highest model of classic style. Translations of several Greek authors, made about the same time, have been partly preserved, and contain some writings of which the originals have been lost—namely, the Chronicle of Eusebius; the Discourses of Philo: Homilies by St. Chrysostom, Severianus, Basil the Great, and Ephraim Syrus. Several old geographical and historical works have been preserved. Among philosophical and theological writers may be mentioned: David, the translator and commentator of Aristotle, Esnik, and Joannes Ozniensis. The *Vitæ Sanctorum Calendarii Armeniaci* (Lives of Armenian Saints, 12 vols. Ven. 1814) contains many notices of the history of Armenia. In poetry and fiction, A. L. is poor. Somal, in his work entitled *Quadro della Storia Litteraria di Armenia* (Venice, 1829), gives a general view

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of the contents of A. L. The Armenian belongs to the Indo-Germanic group of languages, but has many peculiarities of structure. It is harsh and disagreeable to the ear. The old Armenian, the language of literature, is no longer a living tongue; while the new Armenian, split up into four dialects, contains many Turkish words and grammatical constructions.

ARMENTIERES, *âr-mŏn-tĕ-ār'*: town of the dept. of Nord, France, on the Lys, 8 m. from Lille. The town is well built, active and prosperous, having manufactures of cotton, linen, and hemp, and a considerable trade in grain. A. was formerly famous for its cloth, cheese, and bricks Pop. (1891) 28,638.

ARME'RIA: see THRIFT.

ARMET, n. *âr'mĕt* [Fr.]: helmet used in the 13th, 14th, and 15th c. ARMET-GRAND, n. an armet worn with a beaver. ARMET-PETIT, armet worn without a beaver. It had a guard for the face consisting of three bars.

ARMFELT, *ârm'fĕlt*, GUSTAF MAURITZ: 1757, Apr. 1—1814, Aug. 19; b. Juva, govt. of Abo; eldest son of Baron A. For services in opposing the machinations of the nobles, while officer of the Swedish royal guard, he was appointed by Gustavus III. to a post in the service of the crown prince. During the war between Sweden and Russia (1788–90), in which he was commander of one of the three divisions of the Swedish army, his courage and spirit advanced him still higher in the good graces of the monarch. He defeated a Russian force at Summa, near Fredrikshamm; and as military representative of Gustavus, had the honor of concluding a peace at Verela, 1790, Aug. 14. Gustavus, after his assassination, 1792, March 16, in the brief interval before his death, added to his will a codicil intrusting the regency to his brother, Charles, Duke of Sudermania, during the minority of Gustavus IV., naming A. governor of Stockholm, and member of the council appointed to advise with the regent. The Duke of Sudermania, however, could not brook a check upon his liberty of action, and found means to destroy the codicil. A.'s influence rapidly decreased. He was rarely permitted to see the young king; and at last, after a secret interview with young Gustavus, departed as ambassador to Naples, 1792, July. While in Italy, he entered into correspondence with certain parties in Sweden for the purpose of overthrowing the regency, and inducing the states to proclaim Gustavus IV. of age. The correspondence was discovered. A. fled to Poland, afterwards to Russia. He was condemned, during his absence, for high treason, and stripped of his goods and titles, while one of his associates, the beautiful Countess Rudensköld, was subjected to the most brutal punishment, being publicly declared 'infamous,' exposed on a scaffold for some hours, and imprisoned in a house of correction for life. A. expressed his horror of such an atrocity in language sufficiently emphatic, yet, at a later period, he did not scruple to accept office under Charles, on his election to the

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throne. In 1799, Gustavus IV. received the crown at the age of eighteen, and A. was restored to all his honors. In 1805, he was appointed gov.gen. of Finland; and in 1808 he commanded the Swedish army raised for the invasion of Norway; but his plans were so completely frustrated, that he was compelled to witness the invasion of Sweden by the successful Norwegians, and was in consequence recalled and dismissed by the king. In the following year a revolution took place, Gustavus was deposed, the Duke of Sudermania elected in his place, and A. was appointed president of the Military Council. But shortly afterwards, being implicated in the poisoning of the Prince of Augustenburg, he fled to Russia, where he lived during the remainder of his life in high honor. The title of count was conferred on him, he was made chancellor of the University of Abo, president of the board of Finnish affairs, and member of the Russian senate. He died at Tzarskœ Selo, 1814, Aug. 19.

ARMIDA, *ar-mē'dā:* one of the most prominent female characters in Tasso's *Jerusalem Delivered.* As the poet tells us, when the Crusaders arrived at the holy city, Satan held a council to devise some means of disturbing the plans of the Christian warriors, and A., a very beautiful sorceress, was employed to seduce Rinaldo and other Crusaders. Rinaldo was conducted by A. to a remote island, where, in her splendid palace, surrounded by delightful gardens and pleasure-grounds, he utterly forgot his vows, and the great object to which he had devoted his life. To liberate him from his voluptuous bondage, two messengers from the Christian army—Carlo and Ubaldo—came to the island, bringing a talisman so powerful that the witchery of A. was destroyed. Rinaldo escaped, but was followed by the sorceress, who, in battle, incited several warriors to attack the hero, and at last herself rushed into the fight. She was defeated by Rinaldo, who then confessed his love to her, persuaded her to become a Christian, and vowed to be her faithful knight. The story of A. has been made the subject of an opera by Gluck and by Rossini.

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ARMIES: armed forces under regular military organization, employed for war. An army may comprise all the military men employed by the state, or only a portion under a particular commander. When an armed force is under no constituted authority, and imperfect in organization and discipline, it cannot be said to be worthy of the name of an army, and may be little better than a horde of banditti. Of this nature are *filibusters* (q.v.). Through ages of experience, the principles of military organization, and the laws to which A. are specially amenable, have gradually reached a high degree of perfection. The primitive wars among barbarous people are always stealthy, depending on the forest and the wilderness for their tactics, and considered successful if an enemy can be attacked unawares, despoiled, and carried into slavery. After a time, war advances to the position of an art, and is conducted by men who have received a certain training. An army becomes an instrument not only for vanquishing enemies, but for seizing countries. Even then the highest position of an army is not reached; for the defense of a country requires more military skill, perhaps, and a better organization of troops, than an attack. See ARMY (various titles): also ARMOR: ARMS.

ANCIENT ARMIES—*Egyptians.*—The most extraordinary conqueror among the Egyptians, Sesostris or Rhamses, lived sixteen centuries before the Christian era; and although the evidence for his deeds of valor is questionable, there is reason to believe that the organization of his A. can be pretty accurately traced. His father, Amenophis, laid the foundation for the military glory of Sesostris. When the latter was born, Amenophis caused all the male children who were born on the same day as his son to be set apart as a special body, to be reared for a military life; they were taught everything that could strengthen their bodies, increase their courage, and develop their skill as combatants and leaders; and were to consider themselves bound as the chosen dependents or companions of the young prince. In due time Sesostris became king of Egypt; and then he formed a sort of militia, distributed as military colonists, each soldier having a portion of land to maintain himself and his family. When this militia had been drilled to military efficiency, Sesostris headed them as an army for military conquest in Asia, and placed the chosen band above mentioned as officers over the different sections of the army.

Persians.—In the great days of the Persian empire, the flower of the army consisted of cavalry, who were distinguished for their bravery and impetuosity of attack. The infantry were little better than an armed mob. The war-chariots, too, though calculated to strike terror when dashing into hostile ranks, were available only on level ground. As to the numbers of men composing the great Persian A., the statements are too wild to be trustworthy. Allowing for all exaggeration, however, it is certain that the Persian A. were very large. When Darius was opposed to Alexander the Great, his army was set down at various

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numbers—from 750,000 to 1,000,000 men. The king was in the centre, surrounded by his courtiers and body-guard; the Persians and Susians were on the left; the Syrians and Assyrians on the right. The foot-soldiers, forming the bulk of the army, and armed with pikes, axes, and maces, were formed in deep squares or masses; the horsemen were in the intervals between the squares, and on the right and left flanks; and the chariots and elephants in front.

Lacedæmonians.—The Greeks introduced many important changes in A., both in organization and in maneuvers. Every man, in the earlier ages of the country at least, was more or less a soldier, inured to a hard life, taught to bear arms, and expected to fight when called upon. The leading men in each state paid attention to organization and tactics in a way never before seen. It was not standing armies, but a sort of national militia, that gained Marathon, Platæa, and Mycale. So far as concerned the arrangement of A., the Lacedæmonians invented the *phalanx* (q.v.), a particular mode of grouping foot-soldiers. This phalanx consisted of eight ranks, one behind another; the front and rear ranks being composed of picked men, and the intermediate ranks of less tried soldiers. The number of men in each rank depended on the available resources of the commander. These men were mostly armed with spears, short swords, and shields.

Athenians—The Athenians made a greater number of distinctions than the Lacedæmonians in the different kinds of troops forming their A. They had heavy infantry, constituting the men for the phalanx, and armed with spears, daggers, corselets, and shields; light infantry, employed in skirmishes and in covering the phalanx, and armed with light javelins and shields; a sort of irregular infantry, who, with javelins, bows and arrows, and slings, harassed the enemy in march, and performed other services analogous in some degree to those of sharpshooters in a modern army. It is recorded that Miltiades, the Athenian hero at Marathon, invented the 'double-quick march,' to increase the momentum of a phalanx when rushing on the enemy.

Macedonians.—Philip of Macedon, the father of Alexander the Great, having the sagacity to see that he could not vanquish his neighbors so long as he adopted the same formation and tactics as themselves, set about inventing something new. He resolved to have a standing army instead of a militia; to have at command a set of men whose trade was fighting, instead of citizens who were traders and soldiers by turn. As a further change, he made the phalanx deeper and more massive than it had been among the Lacedæmonians. He brought into use the Macedonian pike, a formidable weapon 24 ft. in length. With a phalanx sixteen ranks in depth, four rows of men could present the points of their long pikes protruding in front of the front rank, forming a bristling array of steel terrible to encounter. Besides these heavy infantry, there were light troops marshalled into smaller bodies for more active maneuvers. Philip organized three kinds of cavalry—heavy, armed with

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pikes, and defended by cuirasses of iron mail; light, armed with lances; and irregular.

Thebans.—This nation introduced the army-formation of *columns*, much deeper than broad, or having more men in file than in rank. A new kind of tactics was introduced in accordance with this formation; the movement being intended to pierce the enemy's line at some one point, and throw them into confusion.

Romans.—These able warriors initiated changes in army matters, which had wide influence on the nations of the civilized world. About 200 B.C., every Roman, from the age of 17 to 46, was liable to be called upon to serve as a soldier; the younger men were preferred; but all were available up to the middle-time of life. They went through a very severe drilling and discipline, to fit them alike for marching, fighting, camping, working, carrying, and other active duties. Every year the senate decreed the formation of *legions*, or army corps, deputing this duty to the consul or pretor. Magistrates sent up the names of eligible men, and tribunes selected a certain number from this list. See LEGION. The Roman legion, in its best days, had many excellent military qualities—great facility of movement; a power of preserving order of battle unimpaired; a quick rallying-power when forced to give way; a readiness to adapt itself to varying circumstances on the field of battle; a formidable impetuosity in attack; and a power of fighting the enemy even while retreating. The heavy infantry were armed with javelins, heavy darts, pikes, and swords; the lighter troops with bows and arrows, slings, and light javelins; while the defensive armor comprised shields, cuirasses, helmets, and greaves.

Those ancient nations which had no distinctive features in their A. are not noticed here.

MEDIÆVAL ARMIES.—The downfall of the Roman empire marked the dividing-point between ancient and mediæval times in military matters, as well as in other things that concern the existence of nations. The barbarians and semi-barbarians, who attacked on all sides the once mighty but now degenerate empire, gradually gained possession of the vast regions which had composed it. The mode in which these conquests were made gave rise to the *Feudal System* (q.v.). What all had aided to acquire by conquest, all demanded to share in proportions more or less equal. Hence arose a division of the conquered territory; lands were held from the chief by feudal tenure, almost in independent sovereignty. When European kingdoms were gradually formed out of the wrecks of the empire, the military arrangements took on a peculiar form. The king could not maintain a standing army, for his barons or feudal chieftains were jealous of allowing him too much power. He could only strengthen himself by obtaining their aid on certain terms, or by allowing them to weaken themselves in intestine broils, to which they had always much proneness. Each baron had a small army composed of his own militia or retainers, available for battle at short notice. The contests of these

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small armies, sometimes combined and sometimes isolated, make up the greater part of the wars of the middle ages. Of military tactics or strategy, there was very little; the campaigns were desultory and indecisive; and the battles were gained more by individual valor than by any well-concerted plan.

One great exception to this military feudality was furnished by the *Crusades* (q.v.). So far as concerns A., however, in their organization and discipline, these expeditions effected but little. The military forces which went to the Holy Land were little better than armed mobs, upheld by fanaticism, but not at all by science or discipline. Numbers and individual bravery were left to do the work, combination and forethought being disregarded.

A much greater motive-power for change, during the middle ages, was the invention of gunpowder. When men could fight at a greater distance than before, and on a system which brought mechanism to the aid of valor, everything connected with the military art underwent a revolution. Historically, however, this great change was not very apparent until after the period usually denominated the middle ages. The art of making good cannon and hand-guns grew up gradually, like other arts; and A. long continued to depend principally on the older weapons —spears, darts, arrows, axes, maces, swords, and daggers.

During the greater part of the 14th and 15th centuries, the chief A. were those maintained by the Spaniards and the Moors on one European battle-ground, by the English and the French on another, and by the several Italian republics on a third. In those A., the cavalry were regarded as the chief arm. The knights and their horses alike were frequently covered with plate or chain armor; and the offensive weapons were lances, swords, daggers, and battle-axes. A kind of light cavalry was sometimes formed of archers on smaller horses. As to army-formation, there was still little that could deserve the name; there was no particular order of battle; each knight sought how he could best distinguish himself by personal valor; and to each was usually attached an esquire, abetting him as a second during the contest. Sometimes it even happened that the fate of a battle was allowed to depend on a combat between two knights. No attempt was made, until towards the close of the 15th c., to embody a system of tactics and maneuvers for cavalry; and even that attempt was of the most primitive kind. Nor was it far otherwise with the foot-soldiers; they were gradually becoming acquainted with the use of firearms; but, midway, as it were, between two systems, they observed neither completely; and the A. in which they served presented very little definite organization.

Modern Armies.—The formation of *standing* armies may be said to have introduced the modern military system. When the remarkable exploit of Jeanne d'Arc (Joan of Arc) had enabled Charles VII. to check the victorious progress of the English in France, he set about remodelling his army. By gradual changes, amid

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great difficulty, he converted his ill-governed forces into a disciplined standing army. During the reign of his son, Charles VIII. (1483–98), the consequences of this change made their appearance. Charles conducted a well-appointed army into Italy (1494), in support of some pretensions which he had to the throne of Naples.

The change made by Charles VII. was not simply that of substituting a compact standing army for an ill-organized medley of feudal troops and of mercenaries; feudalism itself gave way under the influence of this combined with other reforming agencies. So far as concerned the actual formation and discipline of the standing A. above noticed, a few changes were from time to time introduced: pistols and carbines were given to the cavalry; cuirasses were worn by the heavy troopers; and new evolutions were introduced. During the Thirty Years' War (1618–48), Gustavus Adolphus and Wallenstein adopted opposite modes of dealing with masses of infantry: the former spread them out to a great width, and only six ranks in depth; whereas the latter adopted a narrower front, with a depth of twenty to thirty ranks. Frederick the Great, in the next century, introduced a most complicated system of tactics and drilling; insomuch that when he could maneuver, he nearly always won his battles; but when the result depended on bold and unexpected onslaughts, he was more frequently a loser than a winner. The great military leader in the early part of the present century, Napoleon Bonaparte, made a larger use than any previous European general of the method of moving masses of troops with great celerity, beating the enemy in detail before they could combine in one spot.

It is desirable to present, in the most condensed form, a few statistics of the actual A. of Europe; leaving to titles of the several countries, cities, and battle-fields, all details concerning special armies and military encounters.

The army forces of all the countries of the world 1892 were as follows.

Argentine Republic: 11 generals, 238 field officers, 880 subalterns, 238 engineers, 789 artillerists, 2,227 horse, 2,321 foot—total 5,585 combatants. Militia 236,000 men of 17–45 years. There was a milit. school with 125 cadets, and a school for non-commissioned officers.

Austria-Hungary: on peace footing, inf. 188,655, cav. 48,846, artil. 33,132, technical troops 10,148, train 3,851, sanitary 4,698, higher officers 4,116, establishment, etc., 15,501—total 337,419. On the war footing the total strength was 1,872,178. The yearly contingent of recruits for the army amounted to 103,100. Milit. service begins at 21 years, and the men serve 3 years in the line and 7 years in the reserve. Horses (peace) 56,930, (war) 279,886.

Belgium: (peace) inf. 27,295, cav. 5,657, artil. 7,954, engineers 1,545, gendarmerie 2,446, gen. staff, train, administrative, milit. school, etc., 2,714—total 45,711; horses, 8,836. War footing, 154,780 men, 14,000 horses. Beside

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the army, there was a 'civic guard' organized in communes of 10,000 inhabitants.

Bolivia: 1,112 men, 140 officers in actual service: all citizens are bound to serve in the 'national guard.'

Brazil: (1891) 28,877 men, 1,600 officers, 15,000 gendarmerie.

British Empire: regular army (exclusive of India) 7,453 commissioned officers, 993 warrant officers, 15,886 sergts., 3,684 drummers, fifers, etc., 125,680 rank and file—total 153,696; horses 14,531. The organized milit. forces of colonies, dependencies, etc., of Great Britain were as follows: *Honkong*, artil. corps 100 men. *India* (European army), 73,405 officers and men; (native army) 144,839—total 218,244. *Straits Settlements* (for the Straits Settlements and all other colonies and dependencies only the local forces are enumerated here. The imperial forces are included in the total for the whole empire), armed police force of 2,031, volunteer artil. 105 officers and men. *Cape Colony*, mounted riflemen 819, Cape police 871 men, 609 horses; every able-bodied man 18–50 years old is subject to milit. service both beyond as well as within the colonial limits. *Zanzibar*, 1,200 men. *Canada*, volunteer force of 37,613 officers and men. *Jamaica*, volunteer militia 600. *New South Wales*, regular milit. force 538, 4,146 volunteers, 4,601 reserves. *New Zealand*, volunteers 8,112, permanent militia artil. force of 149 officers and men; all males of 17–55 years liable to serve in the militia. *Queensland*, drilled force of 4,500 men; males 18–60 years are subject to milit. duty. *S. Australia*, militia force of 1,373, and volunteers 777, artil. corps 52. *Tasmania*, volunteers 2,106 officers and men. *Victoria*, organized force of 5,571. *W. Australia*, volunteer force of 688 officers and men.

Bulgaria: see *Turkish Empire.*

Canada: see *British Empire.*

Cape Colony: see *British Empire.*

Chile: 2 regts. artil., 1 battalion coast artil., 1 of sappers, 8 of inf., 3 of cav.—total 5,800 officers and men; national guard 48,530.

China: men of all arms 980,000.

Colombia, Republic of: peace footing, 5,500 men. Every able-bodied man liable to milit. service.

Costa Rica: 600 men; militia 31,824.

Denmark: total war strength 60,000, exclusive of the extra reserve, numbering 16,500.

Dutch East Indies: see *Netherlands.*

Ecuador: 3,341 officers and men; national guard 30,000.

Egypt: see *Turkish Empire.*

France: in the active home army there were 499,851 officers and men, of whom 475,302 were in the regular army, the rest in the gendarmerie and the garde republicaine; there were 121,018 horses. The army of *Algeria* comprised 56,616 regular troops, 1,058 gendarmerie, and the number of horses is 14,395. In *Tunis* were 12,748 men in the regular army, 153 in the gendarmerie; horses 3,577. Total men and officers at home and in Algeria and Tunis

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570,603 men and officers, and 138,990 horses. The territorial army numbered 37,000 officers and 579,000 men. All these forces, with the reserves, amount to about 2,500,000 soldiers; and including all able-bodied men, France could reckon on a grand total of 3,750,000 men (see FRANCE).

German Empire: regular army comprised 20,440 officers, 491,217 rank and file, 93,908 horses. No official statement has ever been published of Germany's war strength, but the 'intelligence division' of the British war office (1888) compiled the following table (which includes in the first table of figures the 'regular' army):

	Field Army.			Garrison army.	Grand total.
	Active troops.	Reserve troops.	Total.		
Officers	22,377	9,536	31.913	16,209	48,122
Surgeons	4,247	1,300	5,547	2,055	7,602
Other officials	7,928	1,933	9,861	3,096	12,957
Rank and file	942,408	354,915	1,297,323	868,627	2,165,950
Horses	280,472	72,963	353,435	86,324	439,759

To this grand total of men and officers add railroad staff and special services and (in case of invasion) the landsturm (700,000), and the result falls little short of 3,000,000 men (see GERMANY).

Great Britain and Ireland: see *British Empire.*

Greece: standing army of 28,229 officers and men, and 3,800 horses. The reserves numbered 104,500, and the territorial army 146,000 men.

Guatemala: army of 3,718 officers and men; the reserve militia had 67,300.

Haiti: regular army of 6,828 officers and men; there was also a 'guard of the govt.,' numbering 650 men, commanded by 10 generals.

Honduras: active army of 500 men; the militia numbered 20,000.

India: see *British Empire.*

Italy: under arms 276,013 officers and men, and 556,152 officers and men 'on permanent leave;' the 'mobile' militia numbered 449,016, and the 'territorial' 1,553,158; grand total 2,844,339.

Japan: peace strength, 3,922 officers, 74,095 rank and file, 7,383 horses; the reserve had a strength of 96,845, and and the landwehr of 70,659 men.

Kongo Free State: authorized force, 3,792 natives, commanded by European officers.

Madagascar: standing army estimated at 20,000 officers and men.

Mexico: total strength 27,244 officers and men. The effective reserve force was stated to be 131.523 inf., 25,790 dragoons, 3,650 artil. All men capable of bearing arms, 20–50 years old, were subject to milit. service.

Monaco: no army, only a 'guard of honor'—75 men and officers.

Montenegro: law requires that all men 17–60 years old, capable of bearing arms, be trained as soldiers, and they are liable to milit. service.

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Morocco: about 10,000 inf. soldiers and 400 cav., beside 2,000 irregular cavalry.

Netherlands: regular army of about 24,000 officers and men. In the *Dutch East Indies* the army is purely colonial, and numbers about 34,000 officers and men.

Nicaragua: active army of 1,200 men, with a reserve of 10,000 and national guard of 5,000.

Norway: active army of about 40,000 men, reserve included.

Orange Free State: no standing army, but every able-bodied man is compelled to take up arms when necessity demands it.

Paraguay: army comprised 82 officers, 1,345 men. Men aged 20-35 years are liable to milit. service.

Persia: milit. establishment comprised 105,500 men, but of these less than 25,000 were in active service.

Peru: total force 5,900 men.

Portugal: standing army of 37,273 officers and men. In Portuguese colonies there is an army of 8,880 officers and men.

Roumania: peace establishment 2,936 officers, 335 employés, 48,500 men, 13,200 horses; territorial army comprised 81,843 men, 4,401 horses.

Russia: army on peace footing numbered (regular troops) 781,000, with 88,750 horses; (Cossacks) 58,500, with 45,500 horses; militia 3,500 with, 3,000 horses—grand total 843,000 men, 137,250 horses. On the war footing the strength in men was 2,532,496, and in horses 577,796.

Salvador: army of 4,000 men and 15,000 militia.

Santo Domingo: small army of inf., cav., and artillery.

Servia: standing army about 18,000 men; the three classes of reserves raise the milit. strength to 210,000 men.

Siam: small standing army; all male inhabitants are required to serve the state in camps three months in each year.

South African Republic: only a small force of horse artil.; the able-bodied men liable to milit. duty numbered 37,378.

Spain: army on peace footing numbered 115,735, on war footing 1,083,505.

Sweden: standing army of 39,543 officers and men, 6,231 horses.

Switzerland: army divided into three classes, viz.; élite 128,000, landwehr about 80,000, landsturm about 269,000; in the élite were enrolled all men aged 20–32 years capable of bearing arms; in the landwehr all 32–44 years; in the landsturm all citizens not otherwise serving, aged 17–50 years.

Turkish Empire: milit. service required of all the Mussulman population: strength of the active army about 9,000 officers and 150,000 men. Among the tributary states *Bulgaria* had an army of 35,800 men on peace footing, and 125,000 on war footing. *Egypt's* army numbered about 13,000 men.

United States: regular army numbered (1892, Dec.) 26,900 officers and men. The organized militia (or 'national

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guard' of the several states) numbered about 10,000 officers and 110,000 men. All men aged 18–45 years are liable to do milit. duty at the call of the president. The number of males of milit. age (1890) was 10,231,239. See UNITED STATES ARMY.

Uruguay: standing army of 3,482 officers and men, an armed police of 3,980, and an active civilian force of 3,264.

Venezuela: standing army numbered 5,000 men.

ARMIGER, n. *ăr'mĭ-jĕr* [L. *armiger*, bearing or carrying weapons—from *arma*, arms; *gero*, I carry]: in *her.*, esquire; one with a right to armorial bearings. ARMIGEROUS, a. *ăr-mĭj'ĕr-ŭs*, bearing arms.

ARMIL, n. *ärm'ĭl* [L. *armilla*, a bracelet—from *armus*, the arm]: an ancient astronomical instrument consisting of one, two, or more rings placed in the plane of the equator, or in the plane of the meridian; a kind of a sun-dial.

ARMILAUSA, n. *ăr-mĭ-law'za* [L. *armiclausa*, a military cloak]: cloak covering the shoulders, worn in England in mediæval times.

ARMILLA, n. *ăr-mĭl'lă* [L. *armil'la*, an ornament for the arm, a hoop]: in *mech.*, an iron ring, hoop, or brace; in *anat.*, the circular ligament of the hand. ARMILLATED, a. *ăr'mĭl-lā-tĕd*, wearing bracelets. ARMILLARY, a. *ăr'mĭl-lĕr-ĭ*, consisting of rings or circles; applied to an artificial sphere composed of a number of circles or movable rings; appearing in the form of several rings or bracelets put together in due position. The ARMILLARY SPHERE is an instrument intended to give a just conception of the constitution of the heavens, and of the motions of the heavenly bodies, as seen by an observer on the earth. It consists of a number of rings fixed together so as to represent the principal circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. It was by means of such rings furnished with sights that Hipparchus, Ptolemy, and other ancient astronomers made many of their observations, and we find even Tycho Brahé making most of his planetary observations with the help of such an instrument. It is, however, now used only as an aid to instruction in astronomy, and in this respect is generally supplanted by the celestial globe. The object of the Armillary Sphere will be better understood by reference to the celestial globe in the diagram. Supposing the observer on the earth to be in the centre of the sphere, the earth on which he stands shuts out from his view the lower half of the heavens, or the part lying below the horizon, HH. The hemisphere above him may be regarded as divided into two equal portions, an eastern and a western, by the meridian, MM, which passes through the pole, P, and the zenith, Z, of which the eastern half is shown in the figure. The north pole is supposed to be elevated above the horizon, and its elevation is measured by the arc NP, or the height above the north point; and the heavens appear to rotate round an axis, PQ, of which P is one extremity; the south pole, Q, the other extremity.

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being below the horizon. The meridian MM, and the horizon HH, are the only circles which maintain a fixed position with regard to the observer. Of the other leading

celestial circles, the equator or equinoctial, LL, extending from the east to the west point of the horizon, the tropics of Cancer and Capricorn, respectively BB and CC, and the Arctic circle, AA, although rotating with the stars, maintain the same position with regard to the horizon; while the ecliptic, KK, is constantly changing its inclination and position towards it. Circles which extend from pole to pole, cutting the equator at right angles, are called circles of declination. The circle which passes through the vernal equinox ♈ (see ARIES), is denominated the equinoctial colure; and that passing through the summer solstice, O (see SOLSTICE), the solstitial colure. The circles just named, together with the Antarctic circle, are represented by corresponding rings in the Armillary Sphere. If S be a star, the following are the names given to the arcs which determine its position with regard to these circles: ♈V, Right ascension; SV, Declination; SP, Polar distance; SZ, Zenith distance; XS, Altitude; (XN + 180°), Azimuth, reckoned from the south pole westward.

ARMINIAN, n. *ăr-mĭn'ĭ-ăn* [from *Armin'ĭŭs*], one who holds the doctrines of Jacobus Arminius (q.v.): ADJ. pertaining to the doctrines of Arminius. ARMIN'IANISM, n. *-i-ăn-ĭzm*, the peculiar doctrines of Arminius (q.v.).

ARMINIUS: famous German hero: 6th c.: see HERMANN, or HERMAN.

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ARMINIUS, *ár-mĭn'ĭ-ŭs*, JACOBUS, the founder of Arminianism: 1560–1609, Oct. 19; b. at Oudewater (Old Water). His real name in Dutch was James Harmensen; but in accordance with the prevailing custom among scholars in those days, he latinized it. His father was a cutler, and died when A. was a child. After a preliminary education at Utrecht, he commenced (1575) a course of study at the newly founded Univ. of Leyden, where he remained for six years, and where he seems to have acquired a high reputation, for the Amsterdam merchants undertook to bear the expense of his further studies for the ministry, on condition that he would not preach out of their city unless permitted to do so. In 1582, he went to Geneva, and received the instructions of Theodore Beza, the most rigid of Calvinists. Here he made himself odious by the boldness with which he defended the logic of Peter Ramus, in opposition to that of the Aristotelians of Geneva, and in consequence had to retire to Basle, whither his fame must have preceded him, for he was offered by the faculty of divinity in that univ. the degree of doctor gratis, which, however, he did not venture to accept, on account of his youth. At Basle he studied under Gyrnæus. He subsequently (1586) travelled into Italy. On his return to Amsterdam (1588), he was appointed minister. Shortly after this, he was commissioned to defend the doctrine of Beza, regarding predestination, against the changes which the ministers of Delft had proposed to make on it. A. carefully examined both sides of the question, but the result of his study was that he himself began to doubt, and at last came to adopt the opinions he had been commissioned to confute. Some time after this change of view, he came, in the course of his expositions, to the Epistle to the Romans, the most explicitly doctrinal in the New Testament, the 8th and 9th chapters of which have always been considered the strongholds of Calvinism. His treatment of this epistle excited much dissatisfaction, and involved him in sharp disputes with his orthodox brethren. Still his views were, as yet, either ambiguously or vaguely expressed, or, at least, had not attained consistency, for in 1604 he was made professor of theology in the Univ. of Leyden.

The greatest enemy of A. was Francis Gomar, his colleague in the Univ. of Leyden. In the course of the year 1604, the latter attacked his doctrines, and from that hour to the end of his life, A. was engaged in a series of bitter disputes with his opponents. The *odium theologicum* was perhaps never exhibited in more unmingled purity. Arminius asserted, in substance, that God bestows forgiveness and eternal life on all who repent of their sins and believe in Christ; he wills that all men should attain salvation, and only because he has from eternity foreseen the belief or unbelief of individuals, has he from eternity determined the fate of each. On the other hand, Gomar and his party, appealing to the Belgic Confession and the Heidelberg Catechism, maintained that God had, by an eternal decree, predestinated what persons shall, as

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being elected to salvation, be therefore awakened to repentance and faith and by grace made to persevere therein; and what persons shall, as being rejected (*reprobati*), be left to sin, to unbelief, and to perdition. See PREDESTINATION: PERSEVERANCE OF SAINTS.

While these fierce disputes were continuing, A. who was not destitute either of friends or influence, was made *rector magnificus* of the univ., but resigned the honor, 1606, Feb. 8, having held the office only one year. All the pulpits in Holland now fulminated against him. At length, 1608, A. himself applied to the states of Holland to convoke a synod for the purpose of settling the controversy; but, worn out with care and disease, he died before it was held, leaving seven sons and two daughters by his wife, Elizabeth Reael, daughter of Laurent Reael, a judge and senator of Amsterdam.

There can be no doubt that A. himself was much less Arminian than his followers. He had not matured his opinions sufficiently to elaborate a complete system of anti-Calvinistic doctrine, though it is perfectly certain that the conclusions at which his disciples arrived—as stated in the famous 'Five Articles'—are the logical and legitimate results of his teaching. He always complained, however, that his opinions were misrepresented; but this is invariably the fate of controversialists, and the penalty of controversy. A. was an extremely good man, as even his enemies allow; his abilities were also of a high order; his thinking is clear, bold, and vigorous; his style remarkably methodical, and, his scholarship respectable, even though not profound.

After the death of A., his followers gained strength, and boldly asserted their views, but still remained a minority. In 1610, they presented to the assembled states of the province of Holland a 'Remonstrance'—from which they were styled 'Remonstrants'—which contained the following propositions: 1. That God had indeed made an eternal decree, but only on the conditional terms that all who believe in Christ shall be saved, while all who refuse to believe must perish; so that predestination is only conditional. 2. That Christ died for all men, but that none except believers are really saved by his death. The intention, in other words, is universal, but the efficacy may be restricted by unbelief. 3. That no man is of himself able to exercise a saving faith, but must be born again of God in Christ through the Holy Spirit. 4. That without the grace of God, man can neither think, will, nor do anything good; yet that grace does not act in men in an irresistible way. 5. That believers are able, by the aid of the Holy Spirit, victoriously to resist sin; but that the question of the possibility of a fall from grace must be determined by a further examination of the Scriptures on this point.

This last point, left as an open question, was decided by the Remonstrants in the affirmative soon afterwards (1611). Whereupon the Gomarists (Calvinists) put forth a strong 'Counter-remonstrance,' asserting plainly absolute predestination and reprobation. After several fruitless discus-

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sions, the states of Holland, 1614, Jan., acting under the advice of Oldenbarneveld, a senator, and the learned Hugc Grotius, issued an edict of full toleration for both parties, prohibiting at the same time the continuance of the controversy. The Counter-remonstrants (or Calvinists) refused to submit to this edict, and the strife soon became so furious that in 1617, or soon afterwards, the Arminians found it necessary to guard themselves from personal violence by appointing a safeguard of militia-men (*Waardgelders*). The controversy now merged in the strife of party politics. The ambitious Maurice of Orange took advantage of the passions of the majority to crush his opponents of the republican party, whose leaders were adherents of the Arminian doctrines. Several Arminians were put to death—among them the aged senator Oldenbarneveld, 1619, May 13—while Grotius and others were imprisoned. In these circumstances, the Synod of Dort was held (1618–19), attended by selected representatives from the Netherlands, England, Scotland, the Palatinate, Switzerland, Nassau, East Friesland, and Bremen. From this convocation, 1619, Jan. 14, the thirteen Arminian pastors, with the learned and eloquent Simon Episcopius at their head, were excluded. The doctrines of the Counter-remonstrants were embodied in 93 canons; the Belgic Confession and the Heidelberg Catechism were confirmed as authorities for the reformed churches of the Netherlands; and 300 Arminians (chiefly preachers) were expelled from office. In consequence of this decision, the defeated party sought shelter in France, Holstein, England, etc. Afterwards, under Frederick Henry, the stadtholder after Prince Maurice (1630), they were again tolerated in Holland, and in 1634 Episcopius opened his theological college in Amsterdam.

Since that time, the Remonstrants (or Arminians) in Holland have inclined more and more towards freedom of thought on religious questions and independence in church government. The rejection of all creeds and confessions; the free interpretation of the Scriptures; a preference of moral to doctrinal teaching; Arian views respecting the Trinity; the virtual rejection of the doctrines of original sin and imputed righteousness, and the view of the sacraments as merely edifying forms or ceremonies: all these and other points of belief display the same tendency which is found in their church polity. Their annual conference on ecclesiastical affairs is composed of ministers and lay-deputies, and meets in June, alternately at Amsterdam and Rotterdam. The number of Remonstrants is now only about 5,000, and is decreasing. In 1809, they had 34 congregations with 40 preachers in Holland; but in 1880, only about 20 congregations. The largest society of Arminians is in Rotterdam, and numbers only 600 members.

Although the Arminians are thus dwindling away as a distinct body, their tenets respecting predestination have been adopted with greater or less modification by several great modern Christian denominations (see METHODISTS; BAPTISTS); as well as by multitudes of the individual mem-

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bers of those churches whose formularies are Calvinistic. See CALVINISM. They are also very prevalent in the Church of Rome.

ARMIPOTENCE, n. *ăr-mĭp'ŏ-tĕns* [L. *arma*, weapons of war; *potens*, powerful]: power in arms. ARMIP'OTENT, a. powerful in arms.

ARMISONANT, a. *ăr-mĭs'ŏ-năn't*, or ARMISONOUS, a *ăr-mĭs'ŏ-nŭs* [L. *arma*, arms; *sonans*, sounding]: having sounding arms, or rustling armor.

ARMISTICE, n. *ăr'mĭs-tĭs* [F. *armistice*—from L. *arma*, arms; *sisto*, I stand still]: a cessation from hostilities between armies, or nations, for a short time; a truce. It sometimes takes place when both sides are exhausted, and at other times when an endeavor to form a treaty of peace is being made. A particular example will best illustrate the nature of an A. The representatives of England, France, Austria, Prussia, Sardinia, Turkey, and Russia, met in congress at Paris, 1856, Feb. 25, to consider the terms of a treaty of peace, which should terminate the 'Crimean' between five of the powers. It was agreed at the first sitting that an A. should be declared, to be announced by telegraphic message to the commanders in the Crimea, and to last until Mar. 31. During that period of about one calendar month, the hostile armies were to remain strictly at peace, though the fleets of the allies were to continue their blockade of Russian ports. The information reached the generals late on Feb. 28. On the morning of the 29th, a white flag was hoisted in the Russian camp outside Sebastopol; several Russian officers assembled around it; and a glittering cavalcade of British, French, and Sardinian officers proceeded thither. The accredited officers compared notes, found the terms of the A. clear, agreed on a boundary-line between the hitherto hostile forces, and formally gave pledges for a cessation of fighting. The courtesy of civilized nations at once succeeded to the horrors of war; the Russian commander gave a magnificent entertainment to the allied commanders, and was entertained in turn; the soldiers 'fraternized,' by little gifts of tobacco, and ludicrous attempts at conversation, across a small stream which formed part of the boundary-line. The A. ended Mar. 31 with a treaty of peace.

ARMITAGE, *ăr'mĭ-tĕj*, THOMAS, D.D., LL.D.: Baptist minister: b. Pontefract, England, 1819, Aug. 2. He was a Wesleyan preacher from his youth, but came to New York 1838 and joined the Meth. Episc. Church. Ten years later he entered the Bapt. denomination and became pastor of the 5th Ave. Bapt. church, New York. He became eminent and popular as a preacher and orator, and at the same time widely known as one of the leading theological writers. He was one of the founders of the American Bible Union, and at one time its pres. He interested himself deeply in the revision of the Scriptures. In 1889 he retired from his pastorate. He wrote *Lectures on Preaching: Its Ideal and Inner Life* (1880); and *A History of the Baptists* (1886). He died 1896, Jan. 20.

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ARMOR, or ARMOUR, n. *ár'mér* [OE. *armure;* F. *armure;* OF. *armeure,* armor—from L. *armatūra,* armor, equipment—from *arma,* arms]: dress for war made of iron or steel; weapons of war. ARMORER or ARMOURER, n. *ár-mér-ér,* one who makes weapons of war. ARMORIAL, a. *ár-mō'rĭ-ăl,* belonging to arms; pertaining to coats of arms; heraldic. AR'MORIST, n. one skilled in heraldry. ARMORY, or ARMOURY, n. *ár'mŏ-rĭ,* a place where weapons of war are kept, or where they are made; a storehouse for arms; a collection of ancient armor and weapons—such as those in the Tower of London, in Sir Samuel Meyrick's mansion at Goodrich Court on the Wye, and in Warwick Castle. The term is applied also to armorial bearings. AR'MOR-BEARER, one who carries the arms of a soldier of rank. AR'MOR-PLATED, a. *-plā-tĕd,* covered with defensive plates of metal, as ships of war. ARMOR is a general name for the apparatus for personal defense as contradistinguished from arms or weapons of offense. Little of it is worn by soldiers at the present day, as hand-to-hand conflicts, in which it is especially serviceable, are not the common mode of modern warfare. It was before the invention of gunpowder that A.—often called in England *harness*—was especially used.

All the ancient nations who occupy a place in history were accustomed to adopt one or other of the defensive clothing or implements which collectively come under the denomination of A. Leather A. was sometimes worn; but brass, iron, and other metals were preferred. Some of the more luxurious leaders had much silver and gold in their A. In the Bible, shields, helmets, breastplates, and greaves are mentioned among the articles of A. borne or worn by the Israelites and their opponents. The classical writers—Homer, Xenophon, Herodotus, Livy, Tacitus, Varro, etc.—supply abundant evidence of the use of A. among the nations concerning whom they wrote.

It is believed that the early Britons bore little or no other A. than shields. The Anglo-Saxons were more fully provided. At different times before the Norman Conquest they appear to have had four-cornered helmets; loricæ made of leather; scale-A.; leathern helmets; wooden shields covered with leather; sheep-skin shields; conical caps or helmets of metal; pectorals or neck-guards; breast-guards of undressed hide; flat-ringed A.; byrnes or tunics of overlapping pieces of leather; close-fitting cuirasses of leather, and sometimes of strong linen; leg-guards of twisted woolen cloth; shields of various sizes, from half a yard to a yard and a half in length; and casques having more or less resemblance to the ancient helmets. When the Danes were in Britain, they had at first no other A. than leathern neck-pieces, which descended some way over the shoulders and chest; and greaves or shin-pieces for the legs. In the time of Canute or Knute, however, they adopted a kind of A. which Sir Samuel Meyrick supposes them to have borrowed from the Norsemen or Norwegians. It comprised a tunic, with a hood and long sleeves; pantaloons which covered feet as well as legs; and sugar-loaf

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shaped helmets or skull-caps, with attached pieces which hid nearly the whole face except the eyes. All these were probably made of leather; but most of the surfaces were strengthened by macles or mascles, a perforated net-work of steel.

With William the Conqueror came in the kinds of A. which were at that time prevalent among the knights and soldiers of the continent of Europe, and which became afterwards more or less combined with the A. previously known in England. William himself occasionally wore a hauberk of ring-A. This kind of A. was much worn during his reign, the rings being usually attached to a foundation of leather. One curious variety of ring-A., called the haubergeon, had the tunic and breeches all in one piece. The helmets were generally conical, with a nasal or nose guard descending from the front. A distinct ring-A., called *hose*, was often worn on the legs. The shield was generally kite-shaped, unlike the oval shields carried by the Anglo-Saxons. Gradual changes in these various portions of A. were made between the reigns of William Rufus and John. In the time of Henry III. were stitched

Suit of Armor, presented by the Emperor Maximilian to Henry VIII.

and padded hauberks and chaussés, called 'ouvrages de pourpointerie'; suits of ring-A.; greaves or shin-pieces of steel; poleyns or knee-guards; vambraces or arm-guards; jacks, jaques, or jackets, made of leather, and worn over the ring-A.; interlaced ring-A., of oriental invention, not requiring to be stitched to any garment or foundation; helmets, visors, and skull-caps of various forms; and chanfrons, or A. for the head and face of horses. During Edward III.'s reign, iron plate-A. was much used by troopers, in the various forms of helmet, breast-plate, gauntlet, and greaves. In the 14th c., chain-mail fell into disuse, and was succeeded by plate-A.; this last-named kind became more and more complicated, and reached its greatest pitch of elaboration in the reign of Richard III. During the times of Henry VII. and VIII., the A. was sometimes fluted, often elaborately engraved, and even damascened or inlaid with gold. Under James I., the knightly ideas

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of the feudal times gave way, and the use of A. declined; a knight armed *cap-à-pie* was a rarity. Charles I. tried in vain to revive its use; and the days of Cromwell were the last in which A. was much worn by the regular soldiers, though helmets and cuirasses are still worn by certain cavalry corps, more for show than for service.—For the chief pieces of A., see the proper titles. For other applications of the term A., see ARMOR-PLATES: DIVING DRESS.

ARMORACIA, n. *âr-mŏr-ā'shĭ-ă* [L. *armoracia;* Gr. *armorakia*, horse-radish—from *Armorica*, where it was said to grow abundantly]: horse-radish, or water-radish; genus of plants belonging to the order *Brassicaceæ*, or Crucifers. It contains one species, the *A. camphobia*, or Great Water-radish, wild in Britain; and another, the *A. rusticana*, or Common Horse-radish, naturalized. The former has yellow flowers, and the latter white. The scientific name of the latter is now *Nasturtium Armoracia.*

AR'MORER, or ARMOURER: a word whose old meaning has nearly passed away with the system to which it belonged. The armor-smiths, or makers of armor, were among the most skilful workers in metal during the feudal times; but their trade afterwards fell away. In the year 1690, the workmen-armorers of London, in a petition to parliament, complained that their trade was well-nigh ruined.

Armorers, in a somewhat different sense of the word, belong to some modern armies and navies: in some armies there are armorers to every regiment, or battalion, or brigade, not to make armor, but to repair arms.

On shipboard the A. is a first-class petty officer, who has, under the gunner, charge of all the muskets, pistols, cutlasses, boarding-pikes, etc., which he is expected to keep clean and in ready order. He is assisted by certain seamen called the 'A.'s crew'; and all are skilled in the general routine of smith's work.

ARMORIC, a. *âr-mŏr'ĭk*, or ARMOR'ICAN, a. *-ĭ-kăn:* relating to Armorica or Brittany, in France. ARMORICA, *âr-mŏr'ĭ-kă:* the country of the Armorici, i.e., 'the dwellers on the sea' [Celt. *ar*, on or near; and *mor*, sea], the name by which the people occupying the coast of Gaul between the Seine and the Loire were known to Cæsar. At a later period, the name was confined to the country afterwards styled Britannia Minor, or Bretagne (q.v.).

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ARMOR-PLATES: thick slabs of iron to protect the sides of ships of war and the fronts of fortifications; a recent invention. In 1812 John Stevens, of N. J. designed, an iron-clad steam battery. In 1842 Mr. Balmano, of New York, proposed that war-ships should be clad with several thicknesses of ¾-inch iron plate, riveted one on another. Robert L. Stevens, of N. J., was commissioned by the U. S. govt. to build an iron-plated war-vessel driven by screws. In 1854 the French sent several floating-batteries to the Black Sea, clad with iron plates; and the English admiralty hastily imitated this example, producing eight very slow and unmanageable batteries, 1855–6. In 1860 the French sent to sea *La Gloire*, a timber-built ship of war, altered from a 90-gun three-decker to a 40-gun corvette, clad with 4½-inch iron plates, having a burden of 3,000 tons. The Brit. govt. then began the creation of an armor-clad navy. Many problems had to be solved—whether to case old wooden ships with armor; to build and case new wooden ships; or to build new vessels, whose hull as well as armor should be of iron. Other problems were—how near the bulwarks should the armor-plates come, how near the bottom of the vessel, how near the stem and stern; also, what thickness of iron, and whether the same thickness in every part.

All the British armored men-of-war built between 1860–76 are 'iron-clads,' plated solely with iron; and in that period the thickness of the plates increased from 4½ inches to 14 inches, the weight increasing proportionately from 4–5 tons to 20–25 tons. The first 'steel-faced' plates used were on the turrets of the *Inflexible*, steel-plate of 9 inches thick forming the outside, iron-plate of 7 inches thick the back layer, a slab of strong teak being interposed 'sandwich fashion' between the two. Other British turret-ships have armor 12–18 in. thick.—In the Italian navy, the *Duilio* and *Dandolo* are armored with steel-plate of the thickness throughout of 22 inches, and the still more gigantic men of-war, *Italia* and *Lepanto*, have a panoply of 3 ft. thickness throughout. The two largest French iron-clads, the *Devastation* and the *Foudroyant*, are plated to a thickness of 14 inches throughout. Germany's *Kaiser* and *Deutschland* have a 10-inch armor mail throughout.

Since 1860, experiments have been conducted by the British and other governments to determine the conditions of the utmost practicable resisting power in ship-armor and the utmost practicable destructive power in ship artillery, experiments causing a constant enlargement of cannon and constant thickening of armor-plate. The experiments in England have been conducted principally at Shoeburyness.

In early experiments on the *Warrior* target, Alderson's steel shell, Armstrong's conical shell, and Palliser's chilled-iron shell were fired at it from a 7-inch gun at 200 yards; the Palliser shot excelled the others, going clean through the target, armor and all, and bursting behind. On another occasion, a Palliser 115-lb. shot went through the target even at an angle of 30° from the perpendicular.

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The advantage contemplated in the 'sandwich fashion' of armor-plating adopted in the case of the *Inflexible* and other ships was, in addition to the increased defensive power implied in the increased thickness of plating, that broader and larger plates of practicable weight could by this means be produced, and that higher excellence of workmanship could be insured to thinner plates than to plates of 20 inches and upwards of thickness. The Italian admiralty tested on an unprecedented scale the relatively defensive properties of iron and steel armor, in 1876, and decided on the adoption of steel armor, the *Duilio* and *Dandolo* thus being the first steel-plated ships.

The next move in armor-plating was with a view to combining the superior resistance to perforation characterizing hard steel with the superior resistance to cracking possessed by tough rolled iron; and 'steel-faced' armor—with a front-plate of steel and a back-plate of rolled iron—attained precedence of iron in English war-ships. The hard steel plate in front resists perforation better than iron, breaking up the projectiles, or rendering them unavailing, while the steel and iron plate does not crack as would steel alone. For thicknesses up to 12 inches, a steel-faced plate, it is calculated, possesses as much resistance to perforation, in case of normal impact (or straight charge), as an iron-plate from 25 to 30 per cent. thicker and heavier; and in case of oblique impact, the superiority of the steel-faced over the iron plate is still greater, glancing projectiles at angles of obliquity at which mere iron would be 'bitten' into. Iron, though inferior to steel-faced plate for protection of the sides and batteries of ships, is found superior for plates 3 to 4 inches thick used for sheeting decks. A test at Spezzia 1882, indicated that a larger number of bolts were needed for a given area of steel or steel-faced plate than had been previously supposed.

Armor clad forts are also attracting attention. Iron has been used largely in the defenses of Plymouth and Portsmouth, Eng. In 1864, a line of iron-clad forts was built up at Shoeburyness, to test several modes of construction.

Regarded as articles of manufacture, armor-plates were at first produced mainly by hammering, several thicknesses of iron being welded one upon another, at a white-heat, by blows of a ponderous steam-hammer; but it is now more customary to produce them by rolling than by hammering—pressure being considered to produce more satisfactory results than percussion.

In the U. S. navy, armor-plating had very small application till since 1883. The 'iron-clads' were mostly fourth-rate monitors with single turrets, though a few experiments with other styles of ships were made. Practically, compared with European nations, the United States had no armored vessels. Since the construction of the 'new navy' began, the United States has developed results in armor-plating surpassing those ever before achieved in the world. Until the U. S. navy dept. took up the question of armor development, but two kinds of plating were known—the all-steel product of Le Creuzot in France, and

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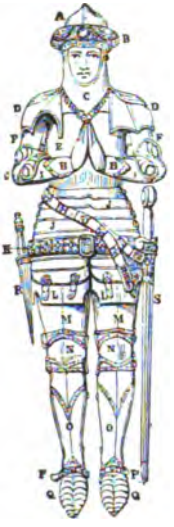
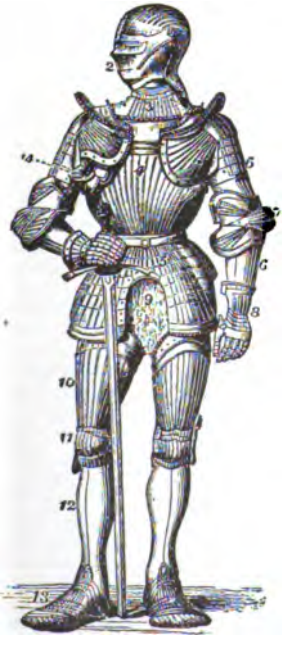


Armor, from the Effigy of Sir Richard Peyton, in Tong Church, Shropshire.—A, Bascinet; B, Jewelled orle round the bascinet; C, Gorget, or gorgiere of plate; D, Pauldrons; E, Breastplate-cuirass; F, Rere-braces; G, Coudes, or elbow-plates; H, Gauntlets; I, Vambrace; J, Skirt of taces; K, Military belt or cingulum, richly jewelled; L, Tuilles or tuillets; M, Cuisses; N, Genouilleres, or knee braces; O, Jambes; P, Spur-straps; Q, Sollerets; R, Misericorde, or dagger; S, Sword suspended by a transverse belt.

Arnotto (*Bixa orelland*).



Armor. — Fig. 1.—From Brass of Sir John de St. Quentin, 1397. Fig. 2.—Complete suit of Plate-armor, beginning of 16th century.—1, Helmet; 2, Visor; 3, Gorget; 3*a*, Camail; 4, Breastplate; 5, Skirt; 6, Arm-pieces; 7, Elbow-piece; 8, Gauntlet; 9, Hauberk; 10, Thigh-piece; 11, Knee-piece; 12, Greaves 13, Sollerets; 14, Lance-rest; 15, Belt.

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the Eng. 'compound armor,' consisting of a steel face welded to a wrought-iron backing. The dept. began with experiments with an alloy of nickel instead of all-steel.

In a trial of armor-plates at Annapolis, Md., 1890, Sep., three types were tested—namely, one of solid steel with about 0·33 per cent. of carbon; one of nickel-steel—i.e., mild steel with 5 per cent. of nickel; and one of steel backed with iron—the Wilson patent. The plates were set side by side and were backed with 36 in. of oak. The gun used in the first series of trials was a 6-in. rifle, 17½ ft. long, set with its muzzle 30 ft. from the plates, and mounted on a carriage, so that it could be turned to point squarely against any part of the several plates. The projectiles were Holtzer chrome-steel shells, 17 in. long, 6 in. diameter, weight 100 lbs. The firing charge was 44½ lbs. of cocoa powder. The initial velocity was about 2,075 ft. per second. Each plate was 4 ft. high, 6 ft. wide, 10·5 in. thick; four shots were fired at each. The concluding test was a shot fired at each plate with an 8-in. rifle, firing an armor-piercing projectile which weighed 210 lbs. and was fired by a charge of 85 lbs. of powder, with an initial velocity of 1,800 ft. per second. The result proved the great superiority of the solid-steel armor over the compound iron and steel plate. As regards the relative efficiency of the solid-steel and the nickel-steel plate, the latter proved far superior to the others, as it was not cracked by the 8-in. shot in the centre, as was the all-steel plate; though the penetration of the all-steel plate was less than that of the nickel-steel. It had long been recognized that the theory upon which the English compound armor-plates were constructed was correct, although its application in practice had failed to produce the desired result. The object was to harden the surface of the plate, but the method adopted, of welding two different materials, resulted in an imperfect union, and rendered the plate liable to destruction by the cracking or stripping off of the hard face. To obviate this difficulty a process of tempering, known as the Harvey process (from its inventor, Hayward A. Harvey, of Orange, N. J.), which had been successfully adopted in the manufacture of tool steel, was applied to armor-plates at the instance of the dept., and among those tried at Indian Head 1891 were several which had been treated in the manner described. The results confirmed the opinion already formed as to the use of nickel steel, as indicated at Annapolis, and were also extremely favorable to the new method of treatment; but it was evident that the process needed perfecting. New trial-plates, therefore, were procured from two contractors, and their first test was at Indian Head, July 20. The first plate used was a 10½-inch plate of nickel-steel made by the Bethlehem Iron Co., the plate having been forged to 12½ inches and then 'Harveyed' and finally reforged to its former dimensions. The results of this trial were in some respects remarkable, yet a lack of uniformity was shown in the surface of the plate, found on investigation to be

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due to the process of reforging, resulting in a lower temperature and consequently increased softness of one side of the plate.

A second plate also had been prepared of nickel-steel, in all respects identical with the first, except that it had been forged to its final thickness before the Harvey process was applied. In the trial of this plate 1892, July 30, five Holtzer 8-inch shells, 250 lbs. each, with striking velocity of 1,700 foot-seconds, and each with an energy of 5,000 foot-tons, were fired at the plate at a distance of 30 yards, making the severest test to which an armor-plate had ever been subjected. The result was extraordinary. The five projectiles were broken up on the surface of the plate. The plate itself showed no signs of injury further than an opening of a slight temper crack four inches in length from one edge, and a bulge less than one inch in thickness at the back of the plate opposite each point of impact. The points of the projectiles were splashed, as it were, on the face of the plate, filling up the indentations made by the blows with their own material, which became welded to the substance of the plate itself, leaving it practically a smooth surface. The results of this trial demonstrated that the new American armor was superior to any other in the world, and that in comparison with it the plating of the great armored fleets of Europe offered but a slight capacity for resistance to projectiles. Other naval powers took immediate notice of the revolution brought about by our navy dept. in the manufacture of armor. A test plate was at once ordered by the Brit. admiralty, and another by the Russian ministry of marine. The trial of the English plate, with 6-inch instead of 8-inch guns, took place Nov. 17, at Portsmouth, with result identical with that in this country. Dec. 13 a trial of the nickel-harveyed plate, 10 in. thick, made for the Russian govt., was held at Ochta. After four 6-inch shots had been fired, without producing any greater impression than in previous trials, the authorities determined to try a heavier gun, with a view to determining what would destroy the plate. Accordingly a 9-inch gun of 35 calibres was used, and a projectile weighing 406 lbs. was fired at the plate with striking velocity of 1,655 foot-seconds. It penetrated and broke up, cracking the plate seriously in several places, but no part of the plate fell off the backing. A second shell of the same calibre was then fired with striking velocity of 1,889 foot-seconds. As a result of this unprecedented test, the plate was broken to pieces, and the whole target of plate and backing fell together to the ground face downward toward the gun. The woodwork and wrought iron backing fell forward with the plate. The shell with its point broken just pierced the wrought iron of the backing. It is considered that had it been a ship the inside of the vessel would have been quite uninjured.

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ARMOUR, *är'môr*, PHILIP D.: capitalist: b. Stockbridge, Madison co., N. Y., 1832, May 16; son of a farmer of Scotch descent. He studied at the Cazenovia seminary. In 1852, with two or three companions, he went to California, where he remained six years and accumulated a considerable fortune. For a time he resided in Milwaukee, and engaged in the grain business and pork-packing. He removed to Chicago 1875, the firm being Armour & Co., dealers in grain and provisions. His packing-house has been said to be the largest in the world. He has become noted both for his gifts and for his personal work in philanthropy. See ARMOUR INSTITUTE.

ARMOUR INSTITUTE: manual and technological training school, presented to the city of Chicago, Ill., by Philip D. Armour (q.v.) 1892, Dec.; designed to supplement the Armour Mission previously established, whose building cost $250,000. The A. I. is supported by the income from the Armour Flats, a block of tenements erected by Mr. Armour and valued at $1,000,000. The Institute building is of stone and marble and iron, is lighted by electricity and heated by steam, and is absolutely fireproof. The purpose being to instruct in the arts and sciences, it is divided into depts. The first of these, chemistry and physics, contains a laboratory and lecture-room, where lectures are delivered on chemistry, physiology, and hygiene. Another dept. is for students in drawing, free-hand, mechanical, and architectural; and for students in commerce and business—the classes being open to both sexes. The whole of one floor is occupied for studios, used by students in drawing or designing book-covers, wall-paper, carpets, and decorations. Another floor is assigned to the domestic arts, cooking, dress-making, millinery, etc. The fifth floor is divided into a gymnasium 60 x 53 ft., and a technical museum. In the art dept., classes are taught embroidery and needle-work, and designing in stone, wood, and the metals. In the cooking dept. a complete kitchen and dining-room are directed by an accomplished *chef*. Besides the general co-education of the sexes, young women are taught the essentials to fit them for professional positions or for economical management of the household. The appliances for these purposes include a completely equipped laundry. There is instruction in practical nursing. Typewriting and stenography also are taught. A library and an equipment of chemical, physical, mechanical, and other apparatus complete the efficiency of this admirable institute, opened 1893.

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ARMOZEEN, n., or **Armozine**, n. *ăr'mŏ-zēn* [Fr. *ar-mosin*—corrupted from *Ormuz*, or *Hormuz*, an island in the Persian Gulf]: a thick plain silk, generally black, used for clerical robes.

ARMS: as weapons of offense—divided into two great classes—those that act by means of gunpowder, and those that do not. Of arms that act otherwise than by explosion, the greater part have been in use from the earliest times; they include the bow and arrow, sling, pike, spear, lance, dart, javelin, dagger, ax, mace, spiked or knotted club, scythe for chariots, dirk, bayonet, sword, cutlass, etc., together with such artillery as the ballista, catapulta, and battering-ram. Weapons depending on the use of gunpowder are of two kinds—those that can be held in the hand, and those that are too heavy to be portable. In the first class are found the names of the hand-cannon, hand-gun, arquebus, haquebut, demi-haque, matchlock, wheel-lock, firelock, currier, snaphaunce, caliver, esclopette, petronel, dragon, hand-mortar, dag, tricker-lock, carbine, fusil, fowlingpiece, blunderbuss, pistol, musket or musquet, musketoon, rifle, etc. In the second class, more usually included under the name of artillery, are found the springel, war wolf, bombard, cart-of-war, culverin, demi-culverin, serpentine, falcon, saker, cannon, howitzer, petard, carronade, mortar, rifled cannon, war-rockets, etc. For the more important of these (of which nine-tenths are utterly obsolete) see the proper titles.

ARMS, Armo'rial Bearings, or Ensigns: devices, which when painted on a shield form a coat of arms. These terms in popular speech include all the accompaniments of a shield—viz., the crest, helmet, and, where such exist, the supporters, etc. See these terms: also **Heraldry**.

ARMS, Assumptive: see **Heraldry**.

ARMS, Bells of: tents mostly of a conical shape, for containing the small-arms for each company in a regiment of infantry. The tent is frequently painted with the color of the facings of the regimental uniforms.

ARMS, Coat of: see **Heraldry**.

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ARMS, Messenger at: see Messengers-at-Arms.

ARMS, Sergeant at: see Sergeant-at-Arms.

ARMS, Stand of: the complete set necessary for the equipment of one soldier, whether horse or foot.

ARMSTRONG, *ärm'strŏng,* **John:** 1709–1779, Sep. 7; b. Castletown, a pastoral parish in Roxburghshire, of which his father was minister. He studied medicine at the Univ. of Edinburgh, and soon afterwards commenced practice in London, and became known by the publication of several fugitive pieces and medical essays. In 1737, he published a very objectionable poem, *The Economy of Love,* which injured his reputation for a time. His principal work, *The Art of Preserving Health,* a didactic poem in blank verse, extending through four books, appeared in 1744. In 1760, he was appointed physician to the forces in Germany. Returning to London, he resumed practice, and died there. He was the author of several vols. in verse and in prose.

ARMSTRONG, John: 1758–1843 (or 55); b. Carlisle, Penn.: American soldier and author. He served in the Revolutionary war, and at its close wrote the *Newburgh Letters,* taking up the cause of the officers who were suffering for their pay. These letters were published anonymously, and caused much excitement. Washington took the matter in hand, wisely averted the dangers of the movement, and did what he could to redress the wrongs of the soldiers. See Irving's *Life of Washington.* He was a brigadier-gen. in the war of 1812. He held several important civil offices, and was secretary of war, 1813–14. Being held responsible for the capture of Washington by the British, he resigned, 1814, Sept. He published several historical works relating to the wars in which he had served.

ARMSTRONG, John: 1784, May 8—1829, Dec. 12; b. Ayres Quay near Bishop-Wearmouth: eminent physician and medical writer. He studied medicine at the Univ. of Edinburgh, commenced practice at Bishop-Wearmouth, and in 1818 he removed to London, where his practice became extensive, and he was elected physician to the fever hospital. His works on medical science were numerous, and of much value, especially regarding typhus fever, and febrile diseases generally. His lectures to his medical classes were published after his death, with the title, *Lectures on the Morbid Anatomy, Nature, and Treatment of Acute and Chronic Diseases, by the late John Armstrong, M.D. Edited by Joseph Rix*—one of his pupils. (London, 1834, 8vo.)

ARMSTRONG, Samuel Chapman, ll.d.: military officer, and educator: 1839, Jan. 30—1893, May 11; b. Wailuka, Main, Hawaii; son of Richard A., d.d. (1805–60, b. Penn. of Scotch-Irish descent). Gen. A.'s mother was b. in Mass., of Puritan stock. His parents went 1831 as missionaries, of the Amer. Board, to the Sandwich Islands. He came to this country 1860, to complete his education, and graduated at Williams Coll., Mass., 1862.

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In that year, he organized a company of vols. and entered the Union army as capt. Three months' imprisonment followed his capture at Harper's Ferry. His gallantry at Gettysburg won his promotion as major 125th N. Y. Vols. He was promoted lieut.-col. 9th U. S. colored inf. 1863; col. 8th U. S. colored inf.; and brevetted brig.gen. vols. 1865. 1866, Mar., he was placed by Gen. O. O. Howard in charge of 10 counties in e. Va. with headquarters at Hampton, then a great contrband camp. In this district there was much irritation between the swarms of colored refugees and Gen. Lee's disbanded soldiers and the former residents; but order and peace were secured by the firm and kindly rule of Gen. A. At this time, according to his suggestion and plan, was established the Hampton Normal and Agricultural Institute (q.v.). Unexpectedly to himself Gen. A. was offered the chief directon of this work, to which he devoted his life with unflagging ardor and self sacrifice. Gen. A. has annually raised by his own efforts at the north $60,000 to carry on this great work. In 1891, in Boston, while making a plea for Hampton he was stricken with paralysis, from which he never entirely recovered. He died at the scene of his labors.

ARMSTRONG, Lord (WILLIAM GEORGE ARMSTRONG), LL.D., D.C.L.: noted for his inventions, especially in artillery and in water-power machinery: b. 1810, Newcastle, where his father was a merchant. A. was articled to a solicitor in Newcastle and became his partner, but gave his leisure to his favorite pursuits in chemistry and mechanics, and his inventive faculty was constantly active. About 1838 he invented a much improved hydraulic engine; in 1845 a hydraulic crane; in 1842, an apparatus for producing electricity from steam, in reality from the friction sustained by the small quantity of water which accompanies the steam in its discharge. These and other inventions brought him into notice; he was elected a member of the Royal Soc. 1846; and shortly afterward, in conjunction with some friends, commenced the Elswick engine works, in the suburbs of his native town, an establishment on a large scale for producing mechanical constructions.

In 1854, while war was raging in the Crimea, the War-office was solicited by many inventors to make trial of new forms of cannon and projectiles. Mr. A., one of the number, was employed to make explosive apparatus for blowing up the ships sunk at Sebastopol. This led him soon afterwards to consider improvements in ordnance, and he devised a form of breech-loading cannon, combining many peculiarities in structure and action. He received encouragement to make a few field-pieces on his new method. He made lengthened experiments on the strength of iron and steel, on the relative merits of cast and wrought iron, on the best number of grooves in rifling, on the best pitch or twist for these grooves, on the most convenient modes of loading at the breech of the gun, on the mechanism for lessening the recoil, on the best form and structure of shot and shells, and on the fuses best suited for igniting the shells during their flight.

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Most of the early experiments were with guns throwing 6-lb. and 18-lb. shot and shells, and subsequently 32-lb. shells. The last-named gun was built up piecemeal, to avoid flaws or faults, and to insure strength, lightness, and durability. It was made in 3-ft. lengths. Bars of wrought-iron, 2 inches wide, were heated to whiteness, twisted spirally round a steel bar or core, and welded; other bars were twisted over these in a similar way, but with an opposite turn of the spiral; a third, and perhaps a fourth were added, according to the thickness and strength needed. Another heating to whiteness preceded a thorough welding of all the layers of bars by a steam hammer. The ends of two of these 3-ft. pieces were then nicely trimmed and adjusted, placed in contact, and bound together by the enormous pressure of a wrought-iron ring shrunk on while at a white heat. By varying the number and length of these sections, a gun of any length could be made. The core was then removed, and the bore of the gun rifled by exquisite machinery. The rifle-grooves were so small and close as to be upwards of 40 in number; their pitch or twist such as to make a complete circuit in a gun 10 ft. long. The breech of the gun was wholly distinct, and constructed in a different way; it could be drawn backward by unscrewing, and had a hole through its centre for introducing the shot or shell and the charge. At first the inventor adopted a steel interior for his gun; but afterwards relied on the toughest wrought-iron. The projectile employed with this gun might be solid shot, shell, case-shot, or canister-shot; but the shell was that to which most interest is attached. It was about three diameters in length; and thus a 32-lb. shot or shell could be fired from a gun of much smaller calibre than if it were spherical. The shell was built up of about 50 separate pieces of cast-iron, very accurately fitted, and enveloped in an iron sheath. Outside of it were two bands of lead, soft enough to be forced into the rifled grooves of the gun, and thus to acquire the rotatory movement by which the straightness of flight is so much insured.

The actual results obtained by a gun such as is above described were almost incredible. An ordinary long 32-pounder weighs 57 cwt.; Armstrong's 32-pounder weighs 26 cwt. The former requires 10 lb. of powder as a charge; for the latter 5 lb. will suffice. The former will send a shot or shell 3,000 yards; the range of the latter exceeds 9,000 yards. The fuses attached to the shells are so exquisitely adjusted that the shell can be made to burst either directly on leaving the gun, or half-way on its path, or when it strikes an object; in the last-named case, even a sack of shavings will afford the necessary concussion; and yet, so close is the structure, that an uncharged shell has been fired completely through 9 ft. of solid oak without the pieces separating. A.'s elaborate experiments were made chiefly with a 6-pounder, 1¾-inch calibre, and so light that two men could carry it (without its carriage); this small gun could reach 1,500 yards with wonderful ac

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curacy of aim, and had a range of 3,000 yards at a certain elevation.

When A. had spent much of his time and thoughts during four years on this subject, the government, supported by the strongly expressed opinions of artillery officers of all ranks, proposed to secure the result of these experiments for the nation. A. offered to the government, without any stipulation, not only all his past inventions, but also all such as he might hereafter discover. This led to arrangements which the ministers in parliament characterized as liberal and patriotic on his part; and the terms thus suggested were accepted. An office was created for him, that of chief-engineer of rifled ordnance, for seven years provisionally; and a certain amount of salary was determined on, in consideration at once of his past inventions and of his future services. He was knighted by the queen in 1858.

The peculiar connection, partaking in some degree of the nature of a partnership, between the government and the Elswick firm, underwent changes from time to time, and was brought to a close in 1863. During its continuance, guns of gradually increasing power were made on A.'s system; 3, 5, and 12 pounders; then 18, 20, 32, and 40 pounders; then rapidly increasing in calibre, until at length a 600-pounder was produced, weighing upwards of 20 tons. The coil system of construction, the adoption of a large number of rifle grooves, and the use of the beautifully formed segment shell, were continued; but A. made variations in the combination of steel and iron, and adopted muzzle-loading for many of his larger guns. Elaborate experiments made by the War-office led to a conclusion that the A. breech-loader has many disadvantages for large ordnance. Notwithstanding its range, accuracy, power of working in a small space, easiness to clean, and safety to the gunners while loading, it is neither so cheap nor so simple as the muzzle-loader; it is difficult to handle, complicated, apt to get out of order, and not so useful for general purposes. The comparative cheapness has had much to do with the preference of the War-office for the Woolwich gun, a muzzle-loader. A. supplies, and has long supplied, many foreign governments with his guns, chiefly of large calibre. The manufacture is of the highest order, effected through the medium of machine tools of exquisite construction; but the practical utility of the gun, as compared with the Whitworth, Palliser, and other kinds, is still matter of controversy. See MACHINE GUN.

The great reputation and commercial success of A. depend on his skill as a constructor of water-power machinery. Early in his career, in 1847, when a plan was adopted for supplying Newcastle with water, he suggested that the power derived from the descent of the water through pipes from the reservoir should be utilized for working hydraulic cranes on the quay, and for various mechanical purposes in the town; this was done with marked success. The system has rapidly grown; until, at length, the A. hydraulic machinery is largely adopted in England and other countries

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for raising, lowering, hauling, and other purposes in connection with railways, canals, docks, piers, harbors, lock-gates, manufactories, warehouses, etc. The fabrication of the machinery employs a very large number of hands at Elswick, where the works are carried on by a joint-stock company. A. belongs to several scientific societies, and was in 1863 elected president of the British Assoc. He has been active in the inquiries concerning the operation of the patent laws. Cambridge and Oxford have conferred honorary degrees on A., and he is a member of several foreign knightly orders. He was knighted by the queen 1858; and was raised to the peerage as Baron A. 1883.

ARMY: a body of men, organized and armed for war. The following are distinctions in the application of the name A. A *Covering A.* is encamped or in cantonments, for the protection of the different passes or roads which lead to the town or other place to be protected. A *Siege A.* is ranged around or in front of a fortified place, to capture it by a regular process of besieging. A *Blockading A.*, either independent of or auxiliary to a siege A., is intended to prevent all ingress and egress at the streets or gates of a besieged place. An *A. of Observation* takes up an advanced position, and by celerity of movement keeps a close watch on all the maneuvers of the enemy. An *A. of Reconnaissance* has a more special duty at a particular time and place, to ascertain the strength and position of the enemy's forces. A *Flying A.* comprises a strong body of horse and foot, moving quickly, to alarm the enemy, and to protect garrisons.

For historical notices or for descriptions of national military forces, see ARMIES: BRITISH ARMY: UNITED STATES ARMY. For the formation, organization, discipline, arms, equipment, duties, and tactics of armies, see the proper titles.

ARMY ADMINISTRATION: the whole of the operations connected with the raising, clothing, paying, maintaining, and controlling of an army. They are distinct matters from military command and discipline. The supreme command of the British army is assigned to the sovereign; but the secretary of state for war is her responsible representative in all that concerns administration—the commander-in-chief being her representative in matters relating to military command and discipline. The secretary is the organ through whom the wishes of the sovereign are reconciled with the wishes and intentions of parliament. Until the war with Russia in 1854, the administrative departments were much scattered; but now they are all consolidated under the secretary of state for war. See WAR DEPARTMENT. In the United States, the president is commander in-chief of all the military forces of the nation; the secretary of war, appointed by the president, has the charge of military administration under the president's direction.

ARMY REGISTER: an annual publication under authority of the U. S. govt., giving the official list of the U. S. Army. It shows the regiments, companies, etc.; the

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officers; with the deaths and promotions during the year previous. A similar publication in Great Britain is called the Army List.

ARMY SCHOOLS: arrangement for instruction under govt. auspices, in connection with the U. S. army. They comprise two plans; one for education of enlisted men; the other for the children of enlisted, men for whom it is compulsory, and for those of officers, for whom it is optional. The schools for soldiers are termed post-schools, and are conducted by officers of recognized ability, detailed for the purpose, and whose duty it is, to instruct enlisted men, and who are assisted by competent persons detailed from the rank and file, in the proportion of not more than 1 to every 15 men. Where a post has a chaplain he is also the instructor. Officers from the inspector-general's dept. inspect these schools at stated periods, and exercise authority in regard to the systems of education and methods employed. Children's schools are established at posts where the number of soldiers' children warrants it, and where no other means for instruction exist; and in such cases the children of private citizens living in the neighborhood of army posts are permitted, on payment of a small stipulated sum, to partake of the advantages.

ARMY-WORM (*Leucania unipuncta*): a gray caterpillar, striped with dark and yellow lines, allied to the cut-worm (q.v.), sometimes very destructive to cereal and forage crops. Though found at the s., it is more common in the n. and central states. The moth is brown, with white dot on the fore-wing. Its eggs are laid, from Apr. to June according to latitude, on grass plants, between the sheath and blade, and hatch in 7 to 10 days. The larva eats voraciously till it reaches its full size, nearly 2 in. in length, in about four weeks. It then forms a cell in the ground, changes to the pupa state, and in 14 to 21 days emerges as a moth. In the n. there are sometimes 2 broods, and at the s. 3 are common in a single season. Many of the moths, and a still larger number of the larvæ, live through the winter. In regions where it finds its home, this insect is usually present in grass-fields, but seldom attracts much attention. Occasionally there is a season in which its numbers are greatly increased, and it causes farmers immense loss. When compelled to migrate for food the caterpillars march in a solid body like an army, take a straight course, and consume every green thing in their path. In about 2 weeks from the beginning of their march they enter the ground to be transformed into moths. Their appearance cannot be confidently predicted, but is most likely after a mild winter preceded by a dry summer. Myriads of these insects are destroyed by contagious diseases; also birds and other insects are very destructive. Their vast numbers make it difficult to check their migrations; but the plowing of deep furrows with the steep sides away from the worms, placing boards on edge to form a fence, and poisoning with Paris green the grass or grain in their path, have been tried with varying success.

ARNAULD, *ärnō'*, ANGÉLIQUE: 1624, Nov. 28—1684,

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Jan. 29; dau. of Robert Arnauld d'Andilly. From her earliest years, she showed extraordinary force and resolutoness of character. When not quite twenty years of age, she became a nun at Port-Royal des Champs, where she had been educated by her aunt, Marie Jaqueline Angélique Arnauld, sister of the great Arnauld. Nine years afterwards she was made sub-prioress; and, removing some years later to Port-Royal de Paris, she held the same office. During the persecution of the Port-Royalists, A. A., by her piety and courage, sustained the spirit of the sisterhood. The whole family, male and female, were determined Jansenists, and none more so than Mother Angélique de Saint-Jean (her conventual name), who met her many misfortunes with earnest intrepidity. A royal order was issued to break up the nunnery. The police arrested the inmates, who were dispersed in various convents throughout France, and constant efforts were made by the Jesuits to induce them to sign the 'Formulary of Alexander VII.' A. A. was alone exempted from listening to their arguments and solicitations, her 'obstinacy' being supposed invincible. At length, by command of the Abp. of Paris, the nuns were restored to Port-Royal des Champs; but for some years they were subjected to a strict surveillance by soldiers, who watched all their movements, and allowed them no intercourse with persons out of the convent. In 1669, however, was issued the edict of Clement IX. for the peace of the church, which was a kind of compromise on the vexed question of Jansenism and Jesuitism. The nuns received back the privileges of which they had been stripped, and constituted their society anew. A. A. was again elected prioress. In 1678, she was made abbess. After the death of her protectress, the Duchesse de Longueville, 1679, the persecution recommenced. At last Angélique sank under a complication of griefs, and died. She was learned without being pedantic, pious without bigotry, and gentle to others in proportion as she was severe to herself. A. A. wrote several works, the most valuable of which is *Mémoires pour servir à la Vie de Mère Marie Angélique Arnauld de Sainte Madeleine, Réformatrice de Port-Royal.*

ARNAULD, Antoine: 1560–1619, Dec. 29; b. Paris: the greatest advocate of his time in France. He was descended from an ancient family in Auvergne, which had distinguished itself in both civil and military affairs. A. was not less remarkable for his eloquence than for his probity. His zealous defense of the Univ. of Paris against the Jesuits in 1594 won for him a wide celebrity. It was reprinted in 1717. He published another work against the Society of Jesus and several tractates of an earnest political character. The Jesuits accused him of being a Huguenot, but the accusation was unfounded, for he had no personal predilection in favor of Protestantism as a distinct religious system. He had several children, who formed the nucleus of the Jansenists and Port-Royalists.

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ARNAULD, ANTOINE, known as the great A.': 1612, Feb. 6—1694, Aug. 8; b. Paris: twentieth and youngest son of Antoine (1560–1619). Although originally intended for the bar; he disliked the legal profession, and entered the service of the church. At the Sorbonne, he became a pupil of Lescot, the confessor of Cardinal Richelieu, and afterwards bishop of Chartres. Lescot initiated him into the scholastic theology; but his attention and admiration were drawn to the writings of Augustine, who, he himself admitted, first showed him the difference between the two states—that of a nature whole and sound, and that of a nature corrupted by sin. In 1641, the Sorbonne wished to receive him into their society, on account of his extraordinary piety and talents, but Cardinal Richelieu opposed this. In the following year he was ordained a priest, and in 1643 he published a work entitled *De la Fréquente Communion*, which was received in the most favorable manner by all except the Jesuits who had taken alarm at the virtues of A., and were already attempting to defame one whom they instinctively felt to be a reproach to their order. As a consequence of this publication, he was now admitted 'of the Society' of the Sorbonne. A. not only replied to the aspersions of the Jesuits in his *Avertissement*, but also sent forth a work which was the prelude to a long and fierce contest with his adversaries, *Théologie Morale des Jésuites* (Moral Theology of the Jesuits). But the hatred of the latter was not confined to literary libels; they advised the chancellor of the Sorbonne to carry the dispute to Rome, whither A. would be obliged to follow and defend himself. In this scheme, however, they were defeated.

A. now buried himself in seclusion for twenty-one years, during which period his pen was almost continuously active. In 1644, appeared his *Tradition de l'Eglise sur la Pénitence* (Opinion of the Church on the Doctrine of Penitence). It was a reply to the attacks which the Jesuits had made against his *Frequent Communion*. A. was still entangled in the disputes which arose out of this treatise, when he became involved in another controversy that colored the whole of his subsequent career, and may be said to have won for him his position in history. This was the great Jansenist controversy. In 1640, had appeared a posthumous work of Jansenius, bishop of Ypres, entitled *Augustinus; seu Doctrina Sancti Augustini de Humanæ Naturæ Sanctitate, Ægritudine, Medicinâ, adversus Pelagianos et Massilienses*. It laid down with a rigor equal to that of Calvin the doctrines of predestination, the corruption of human nature, and the depravity of the will. It was specially intended as a counteractive against the lax principles and loose morality of the Jesuits, many of whom, and especially their great champion, Molina, entertained extreme Pelagian views of the freedom of the human will, which they had cunningly interwoven into their 'scarlet-colored' web of ethics. The work, in the meantime, was condemned by Pope Urban VIII., 1641, Aug. 1. A., who quickly apprehended its vital importance in the existing

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state of things, boldly ventured to defend it against the censures of the papal bull. He published several pamphlets, closing with a first and second *Apologie de Jansénius*. It is to the honor of the religion of A., however, that it was not always controversial. Whenever a moment of armistice was permitted him, he occupied it in writing such works as *Mœurs de l'Eglise Catholique*, *La Correction*, *La Grâce*, *La Vérité de la Religion*, *De la Foi*, *de l'Espérance*, *et de la Charité*, and the *Manuel de Saint Augustine*. He also varied these occupations by translating into Latin his *Frequent Communion*, and by the composition of his *Novæ Objectiones contra Renat. Descartis Meditationes*, and several smaller tractates. In addition to his literary labors, he undertook the direction of the nuns of Port-Royal des Champs, a convent of which his sister, Marie Jaqueline Angélique Arnauld, was abbess. In this retreat he was surrounded by many friends, thirsting like himself for the quiet pleasures of study, some of whom have left their mark in the world, such as Pascal, Nicole, etc. Here they wrote in common numerous excellent works. A. executed parts of the *Grammaire Générale Raisonnée de Géométrie*, and *L'Art de Penser*. In 1649, the Jansenist controversy broke out more fiercely than ever. The *Augustinus* of the Bishop of Ypres was again attacked and condemned by the Sorbonne and the pope. A. replied in his *Considérations*. In 1650, appeared what he conceived to be his best work, *L'Apologie pour les Saints Pères*. For the next half-dozen years he was engaged in constant and painful disputes; yet, in spite of the polemical character of his life, the impression of his piety and earnestness was deepened in the mind of the nation; and on reading some of his compositions, even Alexander VII. is reported to have praised the author, and to have exhorted him for the future to despise the libels of his adversaries. During the strife he published *La Concorde des Evangiles* and *L'Office du Saint-Sacrement*. In 1655–56, for prudential reasons, he left his retreat at Port-Royal; about the same time he was expelled from the Sorbonne and the faculty of theology.

In 1656, the war with the Jesuits was renewed—not, however, by A. in person. An unknown knight with closed visor had ridden into the lists—the great Pascal. Under the *nom de plume* of Louis de Montalto, he discharged his scorpion wit against the Jesuits for about a year and a half in the *Provincial Letters*. A. furnished him with materials; but, in 1658, he took the field *in propriâ personâ* by publishing his *Cinq Écrits en faveur des Curés de Paris contre les Casuistes relâchés*. In 1662, appeared *La Nouvelle Hérésie* (of the Jesuits); in 1669, the first vol. of his *Morale Pratique* (of the Jesuits), the last of which was not published until the year of his death.

A., who was a sincere Catholic after his fashion, next had a theological controversy, properly so-called, with the reformed minister Claude, the consequence of which was his vol., *Du Renversement de la Morale de J. C. par la Doctrine des Calvinistes touchant la Justification* (1672). In 1675, he returned to the subject in his *Impiété de la Morale de*

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Calvinistes. Some years previous to this, A. had enjoyed the peace of Clement IX., which put a stop for the time to the Jansenist controversy. He had been presented to the papal nuncio and to the *Grand Monarque*, both of whom flattered him highly; but the Jesuits, who could not breathe freely in his presence, used their utmost efforts to prejudice Louis against him, and at last the king issued an order for his arrest. A. hid himself for some time, but finally withdrew into Belgium. He felt his exile keenly, though honored by many persons of learning and dignity; and could not rest in one city, but wandered from place to place, ever showing the same astonishing vigor of mind and the same polemical tendency. It is strange that this man, who was celebrated among his friends for equanimity and gentleness of heart, should have been so bitter in his controversies, even with his friends, for he wrote not against his enemies only, but against Pascal, Domat, Nicole, his protector, Pope Innocent XI., and his old friend, Père Malebranche. So earnest was he for the truth—which earnestness had no doubt been greatly intensified by persecution and controversy—that he could never thoroughly recognize that there might be truth on the other side also. He died at Brussels. His works, which amount to upwards of 100 vols., were pub. Paris, 1775–83.

ARNAULD, Robert d'Andilly: 1588–1674, Sept. 27; eldest son of Antoine Arnauld, the advocate; brother of the great Arnauld. He was a person of considerable consequence at the French court, where his influence was ever exerted beneficially. Balzac spoke very highly of him. At the age of fifty five, he quitted the bustle of the world for the solitude of Port-Royal des Champs, where he devoted himself to religious history and biography. His chief works are translations, such as those of the *Confessions of St. Augustine* and of the *History of the Jews*, by Josephus. The latter work is esteemed more elegant than accurate, however. In 1668, appeared his translation of the *Lives of the Holy Fathers of the Desert, and of several Saints;* and in 1670, that of the works of St. Theresa. He was likewise the author of some pieces of religious verse.

ARNAUTS, n. plu. *ár'nawts*, a native name for the Albanian mountaineers, and meaning 'brave men.'

ARND, or Arndt, *árnt*, Johann: 1555–1621; b. at Ballenstadt, Anhalt; was Lutheran pastor at Quedlinburg, Brunswick, and elsewhere, and died at Celle, Hanover. He was remarkable for his piety and active benevolence; but he is known chiefly for a work entitled *True Christianity* (*Wahres Christenthum*), which was translated into most European languages, and is yet popular in Germany. Its object is 'edification'—the promotion of practical religion; and it is written with great warmth and unction, and in a strain of piety bordering on mysticism. It has been called the Protestant à Kempis, and its author the Fenelon of the Protestant Church. There is an English translation by W. Jaques (Lond. 1815, 2 vols.).

ARNDT. Ernst Moritz: 1769–1860, Jan. 29; b. in the

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island of Rügen: prof. in the Univ. of Bonn, and for half a century one of the leading political writers of Germany. After travelling over great part of Europe, he became, in 1806, prof. of history in Greifswald. Here, among other writings, he published his *History of Serfdom in Pomerania*, for which he was formally denounced and accused by several nobles. In his *Spirit of the Times* (Altenb. 1807), he attacked Napoleon with such boldness that, after the battle of Jena, he had to take refuge in Stockholm. Returning under a feigned name, he resumed his functions at Greifswald in 1810; but war becoming imminent, he resigned the following year, and became an active co-operator with the minister, Von Stein, and other patriots, in throwing off the foreign yoke. His numerous fugitive writings, full of energy and fire, contributed not a little to rouse and sustain the spirit of Germany for the war of liberation. His best poems belong to this period, and several of them have become national songs. (A new selection, Leip 1850.) His song, *What is the German's Fatherland?* is sung wherever German is spoken. In 1818, he was made prof. of modern history in the new Univ. of Bonn, but became involved in 1819 in the prosecutions for what were called 'demagogic movements,' and was suspended. Though acquitted on trial, he was made to retire, retaining his salary. After twenty years' suspension, he was restored in 1840. His writings are numerous: we may mention his *Beschreibung und Geschichte der Schottländ, Inseln*, etc. (Leip. 1826): a collection of his fugitive *Schriften für und an meine lieben Deutschen* (3 vols. Leip. 1845); and *Erinnerungen aus dem äussern Leben* (3d ed. Leip. 1842). He was elected a member of the German national assembly in 1848, but seceded from it with the whole Gagern (q.v.) party in 1849. He powerfully supported the party who advocated a constitutional hereditary monarchy, and took a prominent part in the appointment of the archduke John as regent, and in the fruitless deputation to Berlin to offer the empire to the king of Prussia. After the dissolution of the Frankfort assembly, A. did not cease in his fugitive writings to advocate the views of the German national party.

ARNE, *ärn*, THOMAS AUGUSTINE, Mus. Doc.: 1710–78; b. London: one of the best and most genial of English composers. He received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar; but the love of music was too strong to be restrained. Young A. became skilful as a violin-player, forming his style chiefly on the model of Corelli; and his zeal in the study of music induced his sister (afterwards celebrated as Mrs. Cibber) to cultivate her excellent voice. He wrote for her a part in his first opera, *Rosamond*, which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas;* and afterwards his *Comus* (1738), showing greater cultivation of style. He married a singer, Cecilia Young (1840); and after a successful visit to Ireland, was engaged as composer to Drury Lane Theatre, and wrote many vocal pieces for the Vauxhall concerts. The national air,

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Rule Britannia, which was originally given in a popular performance, *The Masque of Alfred*, was his composition. He composed also two oratorios, the opera *Eliza*, and another, *Artaxerxes*, in the Italian style; but his genius was better adapted to simple pastoral melody than to great dramatic compositions. He died in London.

ARNEB, n. *ár'něb:* fixed star of 3½ magnitude, called also *α* Leporis.

ARNEE, n. *ár-nē'*, or ARNA [native name]: the largest animal of the ox kind yet known. It is a native of India,

Skull and Horns of Arnee.

and is found chiefly in the forests at the base of the Himalayas and in the n. e. provinces, never descending to the low plains. It is simply the wild buffalo, and differs from the tame variety in being larger and fiercer. Alone of Indian wild animals, it will charge unprovoked. The

Arnee.
(From an Indian picture.)

A. is technically termed *Bubalus Arni*. The color is slaty black; the hide very thick, with scanty hairs. A pair of horns in the British Museum measure more than six feet each along the outer curve. When the head of an A. is placed with the muzzle on the ground, it requires the outstretched arms of a man to hold the points of the horns.

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From the manner in which the A. is introduced in Indian paintings, it seems to have been sometimes tamed.

ARNHEIM, *ärn'hĭm*, or ARNHEM, the Roman *Arenacum:* cap. of the prov. of Guelderland, Holland; on the right bank of the Rhine, which is here crossed by a bridge of boats; has a considerable transit-trade between Amsterdam and Germany. The environs of this strongly fortified town are exceedingly picturesque. Among its most remarkable buildings are the Reformed Dutch Church, which contains monuments of the dukes of Guelderland; and the town-house, noted for the grotesque adornment of its front, which has gained it the name of Duivelshuis. There are several paper-mills in the neighborhood. Here Sir Philip Sidney died in 1586, after the battle of Zutphen. In 1813, A. was taken by storm by the Prussians, under General Bulow, and the way thus prepared for the occupation of Holland. Pop. (1879) 40,978. (1891) 50,194.

ARNHEM LAND, *ärn'hĕm-:* name formerly applied to a region in North Australia; so called from the ship of the Dutch navigators who discovered it, 1618.

ARNICA, n. *är'nĭ-kä* [Gr. *arnĭon*, a little lamb—from *arna*, a lamb—from the resemblance of the leaf to the soft coat of a lamb]: genus of plants belonging to the natural order *Compositæ*, the tribe *Senecionideæ* The flowers of the ray are female and ligulate, those of the disk hermaphrodite and tubular: The receptacle is naked; the pappus hairy. The root, leaves, and flowers of the Mountain A. (*A. montana*), sometimes called Mountain Tobacco, and Leopard's Bane, are much valued in medicine, and administered in various forms as a stimulant in paralytic affections, typhoid fevers, and other diseases. They are also applied with much benefit to bruises, to promote the re-absorption of extravasated blood. They contain a peculiar volatile oil, a resin, an extractive matter, and an alkaloid (*Arnicina*). The root is perennial and crooked, the stem about two ft. high, simple or little branched, with few leaves, bearing on the summit a head of flowers of a dark golden yellow, often two inches in breadth. It flowers from June to August, forms an ornament of mountain meadows in Germany and Switzerland, and is

Arnica montana.

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found as far s. as Portugal, and as far n. as Lapland. *A. mollis*, n., and *A. nudicaulis*, s., are N. American.

ARNICINE, n. *ăr'nĭ-sēn* [see ARNICA]: a bitter principle contained in the flowers of the *Arnica montana*.

ARNIM, *ăr'nĭm*, ELIZABETH VON, better known as Bettina, wife of Ludwig Achim von Arnim (q.v.): 1785–1859; b. at Frankfort-on-the-Maine. From her childhood excitable and eccentric, an early and profound impression was made upon her mind by the suicide of her friend, the Canoness von Gunderode. The next great event of her life was her devoted attachment to and intimacy with Goethe, at that time a man of nearly sixty. Their correspondence, entitled *Goethe's Letters to a Child*, was published in 1835, and translated by Bettina into English. Her letters are poetical, graceful, and fascinating, though often careless and extravagant, and abound in graphic sketches of men of the time. Goethe turned many of these letters into verse. Bettina's later works were semi-political in their character, and, like her earlier, full of fantastic beauty.

ARNIM, KARL OTTO LUDWIG VON: 1779–1861; b. Berlin: well-known writer of travels and other works. After studying at Halle and Göttingen, he travelled at different times over the most of Europe, and was employed on the embassies at Stockholm and London. His *Flüchtige Bemerkungen eines flüchtigen Reisenden* (Passing Remarks by a Passing Traveller, 6 vols., Berl. 1837–50), is recommended for its clear, elegant style, as contrasted with the lumbering and involved writing of the 'Academic' school. A. also wrote in English *Napoleon's Conduct towards Prussia* (Lond. 1814), and published *German National Melodies*, with German and English text (Lond. 1816). He was the author of a play and several poems.

ARNIM, LUDWIG ACHIM VON: 1781, Jan. 26—1831, Jan. 21; b. Berlin: fantastic but original German writer of romances. After studying the physical sciences, he began his career as an imaginative author with *Ariel's Revelations*, a romance which, though based on the principles of the new poetic school which had then risen in Germany, indicated, nevertheless, that the author could strike out a way of his own. His travels through Germany afforded him an opportunity of catching the peculiarities of popular life in its various provincial manifestations. He was especially interested in the old popular poetry, and stirred up among his countrymen a warmer sympathy for it by the publication, with Clemens Brentano, of *The Boy's Wonderhorn* (Heidelberg, 1806–08). In 1809, appeared the *Winter Garden*, a collection of novels; in 1810, the romance entitled *The Poverty, Riches, Guilt, and Repentance of the Countess Dolores;* in 1811, *Halle and Jerusalem, the Sports of a Student, and the Adventures of a Pilgrim*, in which last his humor took a very saucy turn. In 1817, he published the *Crown Guardians*, a work characterized by its originality, richness of fancy, and vivid portraitures. The later years of his life were spent partly in Berlin and partly at his estate near Dahme, where he died.

AR'NO: next to the Tiber the most considerable river of

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central Italy; rises on Mount Falterona, an offset of the Apennines, 4,444 ft. above the sea, 25 m. n. of Arezzo. It flows s.e. through the deep and fertile valley of Casentino; enters the richly cultivated plain of Arezzo, where it receives the waters of the Chiana; then flows n.w. and n. through the upper valley of the A. (*Valdarno*), one of the most delicious parts of Tuscany; afterward it receives the Sieve, its largest tributary, and turns its course toward the w., flowing past Florence, Empoli, and through the town of Pisa. Total length about 140 m. In old times, the embouchure of the A. was at Pisa; now it is about four or five m. distant, lat. 43° 41′ n., long. 10° 15′ e. The A. is navigable for barges as far up as Florence, but in the summer this frequently becomes impossible. The Italian poets speak of 'the golden A.,' but, in truth, its waters have mostly the unpleasant color of milk and coffee mixed. The A. is noted for rapid and destructive inundations. The most memorable are those of 1537, Sep., when the whole of the Valdarno was laid under water, which rose to the height of 8 ft. in parts of Florence; and that of 1740, caused by the long continuance of the sirocco, which completely melted the snows on the Apennines.

ARNOLD, *âr'nŭld*, or ARNALDO, *âr-nâl'do*, OF BRESCIA: born Brescia; d. 1155: reformer, who attacked the corruption of the clergy of his day. He was educated in France under Abelard, and adopted the monastic life. By his preaching, the people of his native place were exasperated against their bishop, and the fermentation and insurrectionary spirit spread over a great part of the country, when he was cited before the second Lateran Council, and banished from Italy. He retired to France, but experienced the bitter hostility of St. Bernard, who denounced him as a violent enemy to the church. He thereupon took refuge in Zurich, where he lived several years. Meanwhile his doctrines exerted powerful influence in Rome, which ended in a general insurrection against the govt., whereupon A. repaired thither, and endeavored to lead and direct the movement. He exhorted the people to organize a govt. similar to the ancient Roman republic, with its consuls, tribunes, and equestrian order. But they, provoked by the treachery and opposition of the papal party, and disunited among themselves, gave way to the grossest excesses. The city was for ten years in great disorder. Lucius II. was killed by the populace in an insurrection 1145; and Eugenius III., to escape a similar fate, fled into France. These violent struggles were subdued by Pope Hadrian IV., who, feeling the weakness of his temporal authority, turned to the spiritual, and resorted to the extreme measure of laying the city under excommunication; when A., whose party became discouraged, and fell to pieces, took refuge with friends in Campania. On the arrival of the emperor, Frederick I., for his coronation 1155, A. was arrested, brought to Rome, tried, hanged, his body burned, and the ashes thrown into the Tiber.—His followers were called Arnoldists.

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AR'NOLD, BENEDICT: 1740–1801; b. Norwich, Conn., of respectable parentage. He was educated at the common school, being intended for a mercantile life. He was twice apprenticed to druggists, and each time ran away to enlist in the army, only to desert at the risk of his life. He finally began the drug business on his own account in New Haven, but failed under suspicious circumstances. He seems to have been fascinated with the surroundings of military life, and, being plausible, obtained the captaincy of a local militia regiment. When the revolution broke out, A. entered the service of his country, and was appointed colonel. He gained distinction by vigorous action on Lake Champlain, but his dishonesty soon involved him in difficulty with the Massachusetts committee of safety, and he resigned in anger. He returned to the service, however, and was appointed, with Gen. Montgomery, to the command of an expedition against Quebec, which failed, and in which Montgomery was killed and A. severely wounded. He was invalided at Montreal, where some disgraceful transactions added to the heavy cloud on his reputation. He somewhat redeemed himself, 1776, Oct., when, on Lake Champlain, he fought a brilliant naval engagement with a much larger force of the enemy, in which his daring gave him the name of a hero among his countrymen. Soon after this, the action of congress, in naming five major-generals from among officers his juniors in rank and his inferiors in ability, roused an implacable resentment which opened his way to treason. When the English evacuated Philadelphia, A. was sent there in command. Here he lived extravagantly, ran into debt, and was accused of the meanest peculation; and was tried by court-martial and sentenced to be reprimanded by the commander-in-chief. This painful duty was performed by Washington as gently as possible, but A. was more embittered than before. Washington, who still had confidence in him, at his solicitation placed him in command of the important post of West Point. A. entered at once into negotiations with Sir Henry Clinton for the surrender of this charge to the British, for a stipulated reward of a brigadier-general's commission in the British army and the promise of £30,000. The accidental arrest of Major André (q.v.), the agent of Clinton in effecting the negotiations, and the discovery of his papers, resulted in the exposure of A.'s treachery, and the securing of West Point from danger. André was hung as a spy, Arnold escaped, 1780, Sep., on board the sloop-of-war *Vulture*, entered the British service, received £6,000 and a commission, and afterward engaged in some depredations on the James river. Later, he was sent to attack New London, Conn. At the close of the war he retired to England, and afterward did some business in New Brunswick and Guadeloupe; but his latter days were passed obscurely in London, where he died, followed by the contempt even of those in whose interest he had sought to betray his country. A. married, 1779, Miss Shippen, of Philadelphia, who died 1796; he had several children.

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AR'NOLD, Sir EDWIN: author: b. Rochester, England, 1832, June 10. He graduated at Oxford Univ. 1854; was appointed principal of the govt. Sanskrit College at Poona, India, and fellow of the Univ. of Bombay; resigned 1861 and became editorially connected with the London *Daily Telegraph*, with which he still (1890) remains; received the Turkish order of the Medjidie 1876; and became a companion of the Star of India 1877. Besides editorials, criticisms, and reviews, he has published *Belshazzar's Feast*, prize poem (1853); *Poems, Narrative and Lyrical*; *Griseldu, a Drama; Education in India; The Euterpe of Herodotus; The Book of Good Counsels; The Poets of Greece; Hero and Leander* (1874); *The Indian Song of Songs* (1875); *The Light of Asia* (1879); *Indian Poetry* (1881); *Pearls of the Faith* (1883); *The Song Celestial* (1885); *Lotus and Jewel* (1888) and *The Light of the World* (finished 1890). He visited the United States in the autumn 1889 and 1891-2.

AR'NOLD, JONATHAN: patriot: 1741, Dec. 14—1798, Feb. 2; b. Providence, R. I. He was a member of the colonial assembly of R. I. 1776, entered the revolutionary army as a surgeon, and afterward had charge of a hospital. He removed to St. Johnsbury, Vt., served one term in the continental congress, and was judge of the Orange co. (Vt.) court 16 years.

AR'NOLD, MATTHEW: English literary critic and poet: 1822, Dec. 24—1888, Apr. 15; eldest son of Dr. Thomas A. of Rugby; educated at Winchester and Rugby. He greatly distinguished himself at Oxford, where, 1845, he was elected a fellow of Oriel College. In 1851 he was appointed an inspector of schools; and in 1857 prof. of poetry at Oxford, which position he resigned 1867. In 1859, and again 1865, he was sent by the govt. in connection with the commission appointed to inquire into the state of education in France, Germany, and Holland. In 1883 a pension of £250 was conferred on him, and in the same year he lectured in the United States, where he was received with great respect, though with no great enthusiasm. His lecture on 'Emerson,' refusing him the high rank as poet and philosopher usually assigned him, provoked much hostile criticism. A. held the honorary degrees of Edinburgh and Oxford, and an Italian order.

A. was known first as a poet of classic taste and exquisite purity of imagination, but his writings in later years were almost exclusively in prose. His chief productions in verse are *Poems* (1853), containing, among other fine pieces, *Sohrab and Rustum, Tristram and Yseult, Balder*, and *Merope* (1858), an attempt to naturalize in English literature the form of the Greek drama; and *New Poems* (1867). His prose writings are numerous. Among the chief are lectures on *Translating Homer* (1861); *Report on Education in France, Germany, and Holland* (1861); *A French Eton, or Middle-class Education and the State* (1864); *Essays on Criticism* (1865); *Lectures on the Study of Celtic Literature* (1867); *Schools and Universities of the Continent* (1868), *Culture and Anarchy, an Essay in Political and Social*

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Criticism (1869); and *Higher Schools and Universities in Germany* (1874). In *St. Paul and Protestantism* (1870), and still more in *Literature and Dogma* (1872), he startled the public by his piercing and audacious application of literary criticism to religion. In 1875 he published *God and the Bible;* in 1877, *Last Essays on Church and Religion;* in 1879, *Mixed Essays;* and in 1882, *Irish Essays, and Others.* He delivered interesting public addresses.

AR'NOLD, RICHARD: 1828, Apr. 12—1882, Nov. 8; b. Providence, R. I. He graduated from West Point 1850, was connected with the exploration of the route of the Northern Pacific railroad, rendered distinguished services in the civil war, and rose to the rank of brevet maj.gen. U. S. A., and was afterward in command of various forts. He died at Governor's Island, N. Y.

AR'NOLD, THOMAS, D.D.: head-master of Rugby School, England: 1795, June 13—1842, June 12; b. West Cowes, in the Isle of Wight. In 1807 he was sent to the public school of Winchester, where he remained till 1811, when he was elected a scholar of Corpus Christi College, Oxford. In 1815 he was elected fellow of Oriel College, and he gained the chancellor's prize for the two university essays, Latin and English, 1815,17. As a boy, he is said to have been shy and retired; as a youth, disputatious, and somewhat bold and unsettled in his opinions; but before he left Oriel, he had won the good opinion of a college which at that time boasted such names as Copleston, Davison, Whately, Keble, Hawkins, and Hampden. He took deacon's orders 1818, and the year afterward settled at Laleham, near Staines, where he occupied himself in preparing pupils for the university. In 1820 he married Mary, sister of one of his earliest school and college friends, and youngest daughter of the Rev. John Penrose, rector of Fledborough, Nottinghamshire. About ten years were spent in this quiet and comparatively obscure life; he was preparing himself for the arduous post that he afterward occupied; he was maturing his opinions, and he had also already commenced his great literary undertaking, the *History of Rome.* It was a period which he himself was accustomed to look back upon with some regret. His letters at this epoch reveal a fine ambitious spirit bending cheerfully to the task of tuition, more useful than glorious; they show also that those religious and political views which afterward distinguished him were being matured in the privacy of Laleham. 'I have long had in my mind,' he thus writes to a Mr. Blackstone, 'a work on Christian politics, or the application of the Gospel to the state of man as a citizen, in which the whole question of a religious establishment, and the education proper for Christian members of a Christian commonwealth, would naturally find a place. It would embrace also an historical sketch of the pretended conversion of the kingdoms of the world to the kingdom of Christ in the 4th and 5th c., which I look upon as one of the greatest *tours d'adresse* that Satan ever played. . . . I mean that by inducing kings and nations to conform nominally to

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Christianity, and thus to get into their hands the direction of Christian society, he has in a great measure succeeded in keeping out the peculiar principles of that society from any extended sphere of operation, and insuring the ascendency of his own.' At Laleham A. became acquainted with Niebuhr's *History of Rome*. This was an era in his life. It produced a revolution in his historical views, and his own *History of Rome* became modelled almost too faithfully on that of the great German.

From Laleham he was called to the arduous duties of the head-mastership of Rugby School. On these he entered 1828, Aug.; and here he carried nearly to perfection his system of public education. He produced and maintained among the boys a high tone, moral and religious He had the tact to make himself both loved and feared. He guided with great dexterity the *public opinion of the school*. 'In the higher forms,' says his biographer, 'any attempt at further proof of an assertion was immediately checked. "If you say so, that is quite enough; of course I believe your word;" and there grew up in consequence a general feeling that it was a shame to tell A. a lie—he always believes one.' On one occasion, when he had been compelled to send away several boys, he said: 'It is *not* necessary that this should be a school of 300, or 100, or of 50 boys, but it *is* necessary that it should be a school of Christian gentlemen.' But the school was far from occupying the whole energies of A. The *History of Rome* went on; he took part in all the great questions of the day, political and theological. In politics he was a whig, without being fettered by the ties of party. In the theological discussions of the day he was distinguished chiefly by his broad views of the nature of a Christian church. It was his leading idea that a *Christian people* and a *Christian church* ought to be synonymous expressions. He would never tolerate that use of the word church which limited it to the clergy, or which implied in the clergy any peculiar sacredness, or any traces of mediatorial function. The *priest* was unknown to him in the Christian community; this placed him at once in antagonism to the High Church party; and even clergymen of the Low Church complained that he did not set sufficient value on their sacred order. But all men, of whatever party, admitted and admired the zeal with which he taught that the full spirit of Christianity should permeate the whole civil or political life. If he seemed to lower the altitude of the clergy, it was only because he would raise the general level of the laity. As an Englishman, he was convinced that 'the founders of our present constitution in church and state did truly consider them to be identical, the Christian nation of England to be the church of England; the head of that nation to be, for that very reason, the head of the church.' It may be doubted whether this is quite historically correct; but it certainly presents a noble theory to the imagination.

In domestic life, Dr. A. was most happy; here he was distinguished by unfailing cheerfulness and amiability. In 1832 he purchased Fox How, a small estate between Rydal

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and Ambleside, and in this charming retreat he enjoyed in the vacations, among the family circle, his own uninterrupted studies. Fox How has become a classical spot to tourists. For a brief time he held a place in the senate of the London Univ.; he resigned the seat on finding that he could not introduce some measures which he had at heart. In 1842 he received from Lord Melbourne the offer of the Regius professorship of modern history at Oxford. This appointment he accepted with peculiar gratification. He delivered some introductory lectures, which were heard with enthusiastic interest; and it was his intention, on his retirement from Rugby, to enter with zeal on the duties of his professorship. But this and all other literary enterprises were cut short by a sudden and painful death. The last vacation was at hand, the journey to Fox How was to be taken in a few days, when he was seized with a fatal attack of spasm of the heart. Few biographies end more abruptly or more mournfully; but the sufferer met his death with perfect fortitude and in the full Christian hope.—His principal works are *five vols. of sermons;* the *History of Rome* (3 vols.), broken off by his death at the end of the second Punic war; and an *edition of Thucydides.* See *Life and Correspondence of A.*, by the Rev. A. P. Stanley, afterward Dean of Westminster (1845; 12th ed., with additions, 1881).

AR'NOLD, Thomas Kerchever: 1800–1853, March 9; b. Stamford, England: clergyman and author of educational works. He graduated at Oxford 1821; was appointed rector of Lyndon, Rutlandshire, 1830, and there continued till his death. He published his *Greek Prose Composition* 1849, and his *Latin Prose Composition* 1850; both works had an instant great success. He compiled, with J. E. Riddle, an *Eng.-Lat. Lexicon,* pub. 1847.

ARNOTT, or Arnut, n. *ăr'nŭt* [AS. *eorthnot:* contr. for *earth-nut*]: a sort of nut-like root, commonly found in hilly grass-pastures, its presence in the earth being indicated by its tuft of white flowers on a slender stem; the tuberous roots of *Bunĭŭm bulbocăs'tănum* and *B. flexuōsum,* ord. *Umbelliferæ,* eaten under the name of pig-nuts or earth-nuts.

AR'NOTT, Neil, M.D.: 1788–1874, March 2; b. Arbroath; educated at the grammar school of Aberdeen, and at Marischal College in the same city. A. studied medicine at Aberdeen and London; was some years in the naval service of the East India Company, and in 1811 a medical practitioner in London. He was appointed, 1815, physician to the French embassy, and afterward to the Spanish embassy. In 1836 Dr. A. was appointed a member of the senate of the Univ. of London. In 1837 he was named a physician extraordinary to the queen. He died in London. Besides his *Elements of Physics, or Natural Philosophy, General and Medical* (1827), Dr. A. pub. a treatise on *Warming and Ventilating* (1838), *On the Smokeless Fireplace, Chimney Valves,* etc. (1855), and other treatises. He made useful inventions (see Water-bed: Warming and Ventilation). His

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genius showed itself in a very unusual combination of inventive power with the art of popular exposition.

ARNOTTO, or ARNATTO, n. *ăr-nŏt'tō*, or *ăr-năt'tō* [said to be a corrupted W. I. word]: also spelled ANNOTO, ANNOTTA, ANNATTO; also called ROUCOU, and on the continent of Europe, ORLEAN: a red coloring matter obtained in South America and the West Indies from the reddish pulp surrounding the seeds of the Arnotto-tree (*Bixa orellana*) by washing, maceration, fermentation, and subsequent evaporation. It appears in commerce in cakes or balls of 2 to 4 lbs. weight, wrapped in leaves, externally brown, internally of pale blood-red or yellowish-red color, and which have a peculiar animal smell and an astringent taste. Pure A. seldom appears in the market. It is obtained by the mere rubbing off and drying of the red pulpy pellicle which covers the seed; but that which is thus obtained is very pure, and occurs in small round or angular lozenges. The Indians rub this coloring matter into the skin of their whole body, thus intending both to adorn themselves, and to obtain protection against the bites of mosquitoes. A. is used in the medicine of civilized countries, for coloring plasters, ointments, etc.; and to a considerable extent by farmers for giving a rich color to butter and cheese. It is also used in dyeing, although it does not produce a durable color. It is employed to impart an orange tint to simple yellows. It is an ingredient in some varnishes. It dissolves in alkalies, producing a brown solution, from which it is precipitated by acids. It imparts little color to water, but dissolves in alcohol; alcohol and sugar of lead throw down a brick-red precipitate from the alcoholic solution. In South America, A. is very extensively mixed with chocolate, not only for the sake of the color, but also for the improvement of the flavor.—The genus *Bixa* belongs to the natural order *Flacourtiaceæ* (q.v.), and is distinguished by complete flowers with simple stigma, a hispid calyx of five sepals, and a two-valved capsule. The A. shrub is a native of tropical America, but has been introduced into other warm countries. It grows to the height of 7–8 ft., and has heart-shaped, pointed leaves and large flowers of a peach-blossom color, which grow in loose clusters at the extremities of the branches. The capsules are oblong, and contain 30–40 seeds enveloped in red pulp (the A.). The seeds are said to be cordial, astringent, and febrifugal. The roots are used in broth. They have the properties of A. in an inferior degree.

ARNSBERG, *ârns'bĕrg:* one of the three depts. of the Prussian province of Westphalia (q.v.), having 2,900 sq. m. With the exception of the valley of the Lippe, the whole dept. belongs to the highlands of the Lower Rhine. Only in a few of the valleys is there good arable soil; on the other hand, there is a great deal of good timber, more than a third of the whole area consisting of forests. But the principal resources of the district are its subterranean riches, in coal, iron, lead, silver, etc. Its abundant water-

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power has also led to the establishment of numerous factories, mills, etc. Pop. (1890) 1,342,711.

ARNSBERG, chief town of the dept., is on the Rhur, 44 m. s.e. from Münster. It has several manufactures, such as linen, broadcloth, potash, etc. In the orchard below the castle is still pointed out the spot where the famous Femgerichte (q.v.) of A. was held. Pop. (1890) 6,733.

ARNSTADT: *ärn'stät:* chief town in the principality of Schwarzburg-Sonderhausen, in a picturesque country on the banks of the Gera, 12 m. s. of Erfurt. It is one of the oldest Thuringian cities, traceable as far back as A.D. 704. Formerly it was the chief emporium for the trade in fruit and timber between the fertile lowlands and the Thuringian forest region, but is now a manufacturing town, employing many hands in weaving, glove-making, brewing, pottery, etc. A rich vein of rock-salt has been recently discovered in the neighborhood of the town, and a new copper-mine opened. Pop. (1880) 10,516; (1890) 11,537.

AROINT, or AROYNT, ad. *ă-roynt'* [OE. *rynt*, begone; get out of the way: Icel. *ryma*, to make room: said to be a corruption of L. *averrun'cus*, averting evil, but hardly probable]: in *OE.*, begone; away; avaunt thee.

AROKSZALLAS, *ä'rök-säl äsh':* t. of Jazygia, Hungary, 44 m. n.e. from Pesth, an entrepôt for the trade between that city and Upper Hungary. It stands in a plain on the Gyöngöys Patak, a small stream, by which it is almost encircled. The surrounding country is fertile, and affords excellent pasture. Pop. (1890) 11,189.

AROMA, n. *ă-rō'mä* [Gr. *arōma:* F. *arome*]: the fragrant principle in plants; an agreeable odor or smell. AROMATIC, a. *ăr'ō-măt'ĭk*, or AR'OMAT'ICAL, a. spicy; fragrant. AR'OMAT'ICALLY, ad. *-lĭ*. AROMATICS, n. plu. *ăr'ō-măt'ĭks*, spices or perfumes. AROMATIZE, v. *ă-rō'mă-tīz*, to render fragrant; to perfume. ARO'MATIZ'ING, imp. ARO'MATIZED, pp. *-tīzd*. AROMATIZATION, n. *ă-rō'mă-tĭ-zā'shŭn*, the act of rendering aromatic. AROMATIZER, n. *ă-rō'mă-tī'zĕr*, one who. AROMATOUS, a. *ă-rō'-mă-tŭs*, full of fragrance; impregnated with a fine odor.

AROMA: term sometimes employed to designate substances whose extremely minute particles are supposed to affect the organ of smell so as to produce particular odors, and frequently as synonymous with *odor*. The particles diffused through the atmosphere, and affecting the olfactory nerves—if the theory of particles of matter so diffused be correct—must indeed be extremely minute, as odoriferous substances such as musk, the smell of which is felt at a considerable distance, continue to diffuse their odor, and according to this theory, these particles, for years, without sensible diminution of weight. See NOSE, etc. The term A. is usually employed only with reference to particular kinds of odors, not easily defined or distinguished in words. Thus, we speak of the A. of roast meat, and of the A. or *aromatic* smell of hyssop, mint, and other plants. Aromatic smells

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are very characteristic of some natural orders of plants, as *Labiatæ* (Mint, etc.) and *Compositæ* (Milfoil, etc.). They have been generally supposed to depend upon essential oils, but resins are often equally aromatic.

AROMAT'ICS: a class of medicines, which owe their properties to the essential oils, to benzoic and cinnamic acids, to volatile products of distillation, or to odorous glandular secretions. The plants that contribute to this class of medicines are those which yield essences, camphor, or odorous resins, and among the families which yield the most important aromatics are the Labiatæ, Umbelliferæ, Lauraceæ, Myrtaceæ, Aurantiaceæ, Coniferæ, Scitamineæ, Orchideæ, etc. In some cases, the aromatic matter is diffused through all parts of the plant, but it is usually condensed in particular organs, such as the root, in the case of ginger and galanga; or the bark, in the case of cinnamon, canella, and cascarella; or the flowers, as in the case of cloves; or the fruit, as in the case of anise and vanilla: or the wood, as in the case of sandal-wood and aloes-wood; or the leaves, as in the case of most of the Labiatæ, Umbelliferæ, etc.

Aromatics may be arranged in the following sub-classes: (1) Those in which the active principle is an essential oil, as the oil of thyme, lavender, cajeput, neroli, fennel, etc. (2) Those containing camphor, or an allied body, such as artificial camphor obtained from turpentine. (3) Bitter aromatics, in which there is a mixture of a bitter principle and an essential oil, as chamomile, tansy, wormwood, etc. These are tonics and vermifuges. (4) Those of which musk is the type, such as civet and amber; and certain plants with a musk-like odor, such as *Malva moscata*, *Mimulus moschatus*, and *Hibiscus abelmoschus*. (5) Those containing a fragrant resin, as benzoin, myrrh, olibanum, storax, and the balsams of Peru and Tolu, which have stimulant properties. (6) Lastly, those artificially produced by destructive distillation, as tar, creosote, benzol, or the various empyreumatic oils.

As a general rule, these substances act as diffusible stimulants of more or less power, and as antispasmodics, while those in which a bitter principle is present act as vermifuges and tonics. The whole class was formerly regarded as possessing disinfectant and antiseptic properties, and there is no doubt that some, as coal-tar, creosote, etc., strongly possess this property. In this country we usually associate aromatics with other medicines; but in France aromatic infusions, lotions, baths, etc., are much prescribed. For illustration, this is the rule for the composition of Aromatic infusion: Take equal parts of the leaves of sage, ordinary and lemon thyme, hyssop, origanum, wormwood, and mint: infuse 50 parts of these leaves in 100 parts of boiling water.

AROMATIC VINEGAR: differing from ordinary vinegar (which is acetic acid diluted with water) in containing certain essential oils which impart an agreeable fragrance.

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It is generally prepared by adding the oils of cloves, lavender, rosemary, and *Acorus Calamus* (and sometimes camphor) to crystallizable acetic acid, or by distilling the acetate of copper in an earthen retort and receiver, and treating the liquid which passes over with the fragrant oils mentioned above. A. V. is a very pleasant and powerful perfume; it is very volatile, and when snuffed up by the nostrils is a powerful excitant, and hence is serviceable in fainting, languor, headache, and nervous debility. A. V. is generally placed on a sponge in a smelling-bottle or in a *vinaigrette;* it can also be purchased as a liquid in phials; and a drop or two allowed to evaporate into a sickroom overpowers, but does not destroy, any unpleasant odor. The liquid must, however, be cautiously dealt with, as it is highly corrosive.

ARONIA: see CRATÆGUS.

AROOSTOOK, *a-rōs'took:* river rising in the n. of Maine, and emptying into the St. John in New Brunswick, after a course of abt. 120 miles. It has historical interest from its connection with the long-agitated question of the n.e. boundary between British America and the United States.

AROSE, v. *ă-rōz:* see ARISE.

AROUND, prep. *ă-rownd* [*a*, on, and *round*]: about; on all sides: AD. in a circle; on every side.

AROURA, n. *ă-rov'rā* [L. *arura;* Gr. *aroura*—from L. *aro;* Gr. *aroō*, to plow]: corn land; a corn-field; a Grecian measure of superficial extent, a quarter of a plethron, and containing one and a half hektoi. Porter makes it equivalent to 107·37833 sq. feet.

AROUSE, v. *ă rowz'* [AS. *a*, intensive, and *rouse*, a secondary form of *raise*]: to stir up; to excite; to stir from rest to activity. AROUS'ING, imp. AROUSED, pp. *a-rowzd'*.

AROW, ad. *ă-rō'* [*a*, on, and *row*]: in a row; one after the other.

ARPAD, *ăr'pâd:* the national hero of Hungary: son of Amos, the leader under whom the Magyars first gained a footing in Hungary: chosen duke on his father's death, 889, and by incessant warfare with the Bulgarians, Wallachians, Moravians, etc., extended the first conquests of the Magyars on all sides. He also made more than one successful incursion into Italy about 900, and returned laden with booty. He died 907, leaving his son in supreme command. The A. dynasty became extinct in the male line with Andreas III., 1301. A. yet lives in the popular songs of the country, and his history, even in the oldest chronicles, is mixed up with a deal of legendary matter.

ARPEGGIO, n. *âr-pĕd'jō* [It.—from *arpa*, a harp]: in *music*, a chord of which the notes are given, not contemporaneously, but in quick succession, with a harp-like effect. From any one chord, several forms of A. may be

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produced. Bass chords thus treated form an *Alberti Bass*, so named from Domenico Alberti (1730), a popular singer and player, who often played the bass in this style. A. sometimes means a harp-accompaniment.

ARPENT, *âr'pent:* old French land-measure, corresponding to acre. The name is from the ancient Gallic *aripennis*, identified by Columella with the Roman *actus*, or half *jugerum*. Ordinarily an A. may be reckoned as five-sixths of an acre; but the precise comparative value of the three most in use will be seen in the following table:

	French Hectares.
Acre, English imperial or statute, .	0·40466
Arpent, of Paris, ...	0·32400
" d'ordonnance, ...	0·48400
" common, ...	0·40000

ARPINO, *âr-pē'nō*, the *Arpinum* of the ancients: t. of s. Italy, birthplace of Cicero and Caius Marius, in the province of Caserta, 65 m. n. by e. of Naples, on the lower ridge of a lofty hill, abt. 6 m. to the left of the river Garigliano, the ancient Liris. The old town, in early Roman times, was on the top of a steep rock, forming part of the territory of the Volscians. Many remains of the ancient structures are still seen, especially a cyclopean wall, which runs along the n. brow of the hill occupied by the present town, and extending to the ancient citadel. About B.C. 188, the citizens received the freedom of the city of Rome, with all its privileges, and Arpinum, during the later years of the republic, was a flourishing municipal town.

Manufactures of woolen cloth, parchment, paper, and leather are carried on. The town has a charming appearance from the highly picturesque woods and mountains around. Iron, white marble, variegated red marble, and marble of a yellowish color are got in mines and quarries in the neighborhood. Pop. abt. 6,000.

ARQUA, *âr-kwâ':* village in the prov. of Padua, Venice, 12. m. s.w. of Padua, in the heart of the Euganean Hills. Petrarch's furniture is still preserved in the house in which he died here (1374, July 18), and his monument of red marble is in the churchyard. Pop. 1,200.

ARQUATED a. *âr'kwā-tĕd* [L. *arquatus*—from *arquus* (*arcus*) a bow]: bent like a bow; curved.

ARQUEBUS, n. *âr'kwe-bŭs* [F. *arquebuse:* It. *archibuso:* Dut. *hæck-busse*, a gun fired from a rest—from *haak*, a hook; *bus*, a gun]: an old-fashioned hand-gun. ARQUEBUSIER, n. *âr'kwe-bŭs-ēr'*, a soldier armed with an arquebus. ARQUEBUSADE, n. *âr'kwe-bŭs-ād'*, originally a shot-wound from an arquebus, now applied to a distilled water used for the cure of wounds or bruises; other spellings are, ARQUEBUSE, HARQUEBUSS, etc.

ARQUEBUS, or HARQUEBUS: the first form of hand-gun which could fairly be compared with the modern musket. Those of earlier date were fired by applying a

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match by hand to the touchhole; but about the time of the battle of Morat, 1476, guns were used having a contrivance suggested by the trigger of the arbalest or cross-bow, by which the burning match could be applied with more quickness and certainty. Such a gun was the A. Many of the yeomen of the guard were armed with this weapon, on the first formation of that corps in 1485. The A. being fired from the chest, with the butt in a right line with the barrel, it was difficult to bring the eye down low enough to take good aim; but the Germans soon introduced an improvement by giving a hooked form to the butt, which elevated the barrel; and the A. then obtained the name of the *haquebut*. Soldiers armed with these two kinds of weapon were designated *arquebusiers* and *haquebutters*—the former were common in the English army in the time of Richard III., the latter in that of Henry VIII.

Arquebusier.

ARQUERITE, n. *âr'kĕ-rit:* a native silver amalgam, occurring in crystals and arborescent crusts in the mines of *Arqueros*, near Coquimbo, in Chili.

ARQUIFOUX, n. *âr'kwĭ-fô* [F.]: in *commerce*, an ore of lead used by potters to give a green varnish to the articles which they manufacture.

ARRACACHA, *âr-ră-kâ'chă* (*Arracacha esculenta*): plant of the natural order *Umbelliferæ*, native of the elevated table-lands in the neighborhood of Santa Fé de Bogota and Caraccas, and of regions of similar climate in other parts of tropical America. It is much cultivated in its native country for its roots, used as an esculent. The root divides into a number of parts, which resemble cows' horns or large carrots. When boiled, they are firm and tender, with a flavor not so strong as that of a parsnip. The plant is very like hemlock, and has a similar heavy smell. Humboldt, indeed, referred it to the genus *Conium* (Hemlock), but it has since been made the type of a new genus. The flowers are in compound umbels, and are of a dull purple color. The A. was at one time very strongly recommended as a substitute for potatoes; it was introduced into Britain through the exertions of the Horticultural Soc., and its cultivation perseveringly attempted; but it has been found unsuitable to the climate of Britain

Arracacha.

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and of other parts of Europe, where it has been tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavorable to it. The climate of the s. of Ireland resembles that of its native regions more than any other in the British Islands. It seems to require a very regular temperature and constant moisture. In deep, loose soils, it yields a great produce. It is generally propagated, like skirret, by offshoots from the crown of the root. By rasping the root and washing, a starch, similar to arrowroot, is obtained,—There is another species of the same genus, *A. moschata*, a native of the same regions, the root of which is uneatable.

ARRACK, n. *ăr'răk* [Ar. *araq*, sweat, juice], (called also RACK or RAKI): the East Indian name for all sorts of distilled spirituous liquors, but chiefly for that procured from toddy or the fermented juice of the cocoa and other palms, and from rice. The palms in other tropical countries furnish a fermented beverage similar to the toddy of India, and in a few instances also it is distilled, but arrack essentially belongs to India and the adjacent countries. The cocoa-nut palm (*Cocos nucifera*) is a chief source of toddy or palm wine, and is obtained from trees ranging from twelve to sixteen years old, or when they show the first indication of flowering. After the flowering shoot or spadix enveloped in its spathe is well advanced, and the latter is about to open, the toddy-man climbs the tree and cuts off the tip of the flower-shoot; he next ties a ligature round the stalk at the base of the spadix, and with a small cudgel he beats the flower-shoot, and bruises it. This he does daily for a fortnight, and if the tree is in good condition, a considerable quantity of a saccharine juice flows from the cut apex of the flower-shoot, and is caught in a pot fixed conveniently for the purpose, and emptied every day. It flows freely for fifteen or sixteen days, and less freely day by day for another month or more; a slice has to be removed from the top of the shoot very frequently. The juice rapidly ferments, and in four days is usually sour; previous to that, it is a favorite drink known in India by the natives as callu, and to the Europeans as toddy. When turning sour, it is distilled and converted into A., known better to the Hindus by the name of naril, and by the Cingalese as pol or nawasi. A similar spirit is made largely from the magnificent fan-leaved palm, *Borassus flabelliformis*, and also from the so-called date-sugar palm, *Areuga saccharifera*. Large quantities of arrack are made from fermented rice prepared as malt—both in India, Ceylon, and Batavia; in the last-mentioned place, sugar and molasses are added to the rice.

It is probable that the use of arrack is more widely diffused among the human race than the produce of the vine (wine and brandy) and of barley (whisky, beer). The date-palm of the Sahara, the oil-palm of w. Africa, and the cocoa-nut palm of the Pacific Islands are made to yield it.

The unscientific method of preparing these alcoholic

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spirits renders them generally very distasteful to European taste, the process of rectification being rarely if ever employed. Some carefully prepared samples of great age, however, find favor, and are used in making punch and other drinks, not only in India and Java, but small quantities also find their way to Britain, for the gratification of palates trained in India. The cocoa-nut tree is especially valuable for this industry, because it bears twelve times in the year after it once begins, and continues bearing for as much as forty years. It is the rule, therefore, to prevent undue exhaustion of so valuable a tree, to discontinue the collection of juice at intervals, and allow the natural process of fruit-bearing to go on: in this way, it is usual to divide the year between the two crops. Of late years a considerable amount of rum has been produced in the East Indies from the sugar-cane and the molasses yielded by it. This is often called arrack by the natives, and leads to errors as to the statistics of the latter material. The word *Saki*, used by the Japanese for rice spirit, seems only an alteration of *Raki* or Arrack. An imitation A. is prepared by dissolving benzoic acid in rum, in the proportion of 20 grains of the former to 2 pounds of the latter.

ARRAGONITE, n. *ăr-răg'ŏ-nīt* [*Arragon*, in Spain]—also spelled ARAGONITE: a mineral essentially consisting of carbonate of lime, and so agreeing in chemical composition with calcareous spar (q.v.), but differing from it in the form of its crystals, of which the primary form is a rhombic prism with angles of 116° 16′ and 63° 44′, the secondary forms being generally prismatic and pyramidal. The effect of heat on them shows another difference, A. being reduced to powder by a heat in which calcareous spar remains unchanged. Such differences between minerals of the same chemical composition appeared very improbable, and when Stromeyer, 1813, detected the presence of a little carbonate of strontia in A., they were immediately ascribed to this as their cause; but it has since been shown not only that the quantity of strontia is very small, variable, and therefore to be regarded as accidental, but also that the differences between the two minerals may be accounted for by difference of temperature when crystallization was taking place. A. appears to be the product of a crystallization taking place at a higher temperature than that in which calcareous spar is produced; and accordingly it is frequent in volcanic districts and in the neighborhood of hot springs, as at Carlsbad. It is frequently found in trap-rocks, as in Scotland. It sometimes occurs stalactitic. Its crystals are sometimes prisms shortened into tables, sometimes they are lengthened into needles. Twin crystals (*macles*) are very common. *Satin Spar* is a variety of it, in which the crystals are of a fine fibrous silky appearance, and combined together into a compact mass. *Flos ferri* (i.e., flower of iron) is a name given to a coralloidal variety which sometimes occurs in iron mines.

ARRAH, *ăr'râ:* largest town in the dist. of Shahabad

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Bengal; administrative headquarters of the district. It is a municipality, in a fertile country. It is on the route between Dinapore and Ghazipore, 25 m. w. of the former, and 75 m. e. of the latter. During the mutiny of 1857, A. was of interest second only to Cawnpore, Delhi, and Lucknow, connected as it was with a heroic defense, a heavy disaster, and a brilliant victory. The defense was that of an isolated house, for eight days, against 3,000 sepoys with 2 field-pieces, the garrison consisting of less than 20 whites, all civilians, and 50 Sikhs, whose fidelity was doubtful till proved by trial. The disaster was the nocturnal surprise in the jungle of a detachment almost entirely European, sent to the relief of the beleaguered dwelling—the loss having been 290 out of 415. The victory was won by a force of 172 men, 12 of them mounted volunteers, and 3 guns, over a host numbering nearly 20 to 1. In fact, A., happily with the exception of the cold-blooded massacre of women and children, presented, in miniature, nearly all the phases of the most formidable and eventful insurrection on record: see Kaye's *History of the Sepoy War*. Pop. of A. (1891) 46,905.

ARRAIGN, v. *ăr-rān'* [OF. *arraigner*, or *aragnier*, to discourse with, to arraign—from mid. L. *ad ratiōnēs stārĕ*, to plead—from *ratiōnēs*, pleadings in a suit—from L. *ratiōnem*, reason, argument]: to call one to account; to set as a prisoner at the bar of a court of justice; to charge with faults; to accuse publicly. ARRAIGN'ING, imp. ARRAIGNED, pp. *ăr-rānd'*. ARRAIGN'ER, n. one who. ARRAIGNMENT, n. *ăr-rān'mĕnt*, the act of setting a prisoner before the bar of a court for trial; accusation.—SYN. of 'arraign': to accuse; impeach; censure; charge; criminate; indict.

ARRAIGN'MENT, in the practice of the Criminal Law: calling a prisoner by his name to the bar of the court to answer the matter charged upon him in the indictment. And having the presumption of innocence in his favor, it is the law, and so laid down in the most ancient books, that, though charged upon an indictment of the highest nature, he is entitled to stand at the bar in the form and in the garb of a free man, without irons or any manner of shackles or bonds, unless there be evident danger of his escape, or of violence at his hands. When arraigned on the charge of treason or felony, the prisoner is called upon by name to hold up his hand, by which he is held to confess his identity with the person charged. This form, however, is not an essential part of the proceedings at the trial, and it is sufficient for the prisoner, when arraigned, to confess his identity by verbal admission or otherwise. When thus duly arraigned, the indictment is distinctly read to the accused, and he then either confesses the fact—that is, admits his guilt—or he puts himself upon his trial by a plea of *Not guilty*. Formerly, one of the incidents of the A. was the prisoner *standing mute*, as it was called—that is, refraining from, or refusing, a direct answer to the indictment; in which case the court proceeded

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to inquire whether the silence was of malice on the part of the prisoner, or was produced by the visitation of God, and to deal with him accordingly. But now it is lawful for the court to order the proper officer to enter a plea of 'Not guilty,' on which the trial shall proceed, as if the plea had been by the prisoner himself. Where there is reason to doubt, however, that the prisoner standing mute is sane or not, inquiry is had forthwith, resulting either in the entering of the plea 'Not guilty,' or in delivering to custody of a prisoner found insane.

According to Sir Matthew Hale, the term A. is derived from *arraisoner*, *ad rationem ponere*, to call to account or answer, which in ancient French law would be *ad-resoner*, or, abbreviated, *a-resner*. See TRIAL: INDICTMENT: INFORMATION: PROSECUTION; PLEA: VERDICT: NOT PROVEN.

AR'RAN: island in the mouth of the Firth of Clyde, Scotland; about 5 m. s.w. of Bute, 13 w. of Ayrshire, and 4 e. of Cantire, from which it is separated by Kilbrennan Sound. It is of oval form, about 20 m. long and 12 broad; 165 sq. m., of which about 15,000 acres, or a seventh part, are cultivated. The general aspect of A. is mountainous and heathy, and in the n. the jagged peaks are singularly grand. Around the coast is a low belt of ground, with lofty cliffs on the s. and s.w., from which the country rises abruptly. The highest point is Goatfell (in Gaelic named *Gaoth Bheinn* or *Beinn Ghaoith*, 'Wind Mountain'), an obtuse pyramid, 2,865 ft. high, a prominent feature of the island. From its sides slope the romantic glens of Rosa and Sannox, and at its base to the s.e. opens Brodick Bay, at the head of which lay, until lately, Brodick village. The houses which composed it have now been removed, and a new village has spruug up on the opposite side of the bay, called Invercloy, where there is a spacious hotel. To the s. of this, round a bluff headland, is Lamlash Bay, the chief harbor of A., and the best on the Firth of Clyde, sheltered by Holy Island, once the seat of a monastery. A picturesque mass of columnar basalt, 900 or 1,000 ft. high, succeeds. Farther s. lies Whiting Bay, near which are two cascades, 100 and 50 ft. high respectively. At the s.e. point of A. is Kildonan Castle, opposite which is the small isle of Pladda, crowned by a light-house. Large caverns are in the cliffs of the s. and s.w. coast. In one of these, 'the King's Cave,' in the basaltic promontory of Druimodune, Robert the Bruce hid himself for some time. Shiskan Vale, opening into Druimodune Bay, is the most fertile part of A. Loch Ranza, a bay in the n. end of A., runs a mile inland, and is a herring-fishing rendezvous. There is daily communication with A. by means of steamboats from the Clyde, the ports touched at being Brodick, Lamlash, and Corrie.

The geology of A. is almost unique, and displays a greater succession of strata than any other part of the British Isles of equal extent. The s.e. half of A. consists of Devonian sandstone, extending from the e. coast 4 or 5 m. inland, and running s.w. from Brodick beyond the centre of the

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island; and of trap rocks and carboniferous strata, which occupy the middle and w. portions. The n.w. half consists of a central granite nucleus, including Goatfell, bordered on the w. by a tract of mica-slate, and on the n.e. and s. by lower Silurian rocks, which, again, have a run of Devonian sandstone on the e. and s. Lias and oolite lie on the mica-slate. The streams in A. are only rivulets, and one of them tumbles over a precipice 300 ft. high. Some level parts in the s. half of A. are fertile. The chief crops are oats and potatoes. Cattle, sheep, fish, and oats are exported. The greater part of A. belongs to the Duke of Hamilton, whose seat is Brodick Castle. A. forms part of the county of Bute, and contains two parishes. Many antiquities occur, such as cairns, unhewn obelisks, monumental stones, and Druidical circles. Several stone coffins were found in a cairn 200 ft. in circumference. Loch Ranza Castle, now in ruins, was once a residence of the Scots kings. See works by Landsborough and Bryce. Pop. of A. (1894) 5,234.

AR'RAN, South Isles of: three small islands lying n.e. and s.w. across the entrance to Galway Bay, about 4 m. off the w. coast of Ireland, and 27 w. of Galway city. They form the barony of A., and give the title of earl to the Gore family. Total area, 11,287 acres. The principal or w. island, Inishmore, is 7 m. long and 2 broad; Inishmaan, or 'Middle Isle,' is next; and then Inishere to the s.e. The islands consist of the carboniferous limestone of the bed of Galway Bay, and rise to the height of 100 to 200 ft. on the w. side, ending in cliffs facing the Atlantic. Most of the land is rudely cultivated. The chief crops are rye, oats, and potatoes. Most of the inhabitants engage in fishing; and the *corragh* or wicker-work skiff is still seen here. They are subject to famines from parching rainless w. winds in August, destroying the potato-crop. These islands contained at one time 20 churches and monasteries. Inishmore was the centre of these, still known as Aran-na-naomh, or 'Arran of the Saints.' Many pilgrims still visit the old shrines and relics scattered through the islands. St. Kenanach Church, built in the 7th c., still stands, all but its stone roof, and the stone oratories and little bee-hive stone huts of the monks of the 6th and 7th centuries remain. There are nine circular cyclopean fortresses of unhewn, uncemented stones (portions of the walls still being 20 ft. high), supposed to have been built in the 1st c. by the Fir-Bolg or Belgæ. The largest of these, Dun-Aengus, on a cliff in Inishmore, 220 ft. high, is one of the most magnificent barbaric monuments in Europe. Pop. in 1871, 3,050, of which number 2,122 inhabited Inishmore, 433 Inishmaan, and 495 Inishere. Of the total pop. all but 57 were Roman Catholics; 504 could read and write, 143 could read only, and the rest were illiterate. Estimated pop. (1894) 6,496.

ARRANGE, v. *ăr·rānj'* [F. *arranger*, to set in order—from F. *rang*, a row: W. *rhenc:* Scot. *raign*, a row, a ring]: to dispose in a row or line; to put into proper order;

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to adjust; to dispose. ARRANG'ING, imp. ARRANGED, pp. *ăr-rānjd'*. ARRANG'ER, n. one who. ARRANGEMENT, n. *ăr-rānj'mĕnt*, putting into proper order; settlement; a classification.—SYN. of 'arrange': to adjust; accommodate; adapt; dispose; settle; prepare; determine.

ARRANG'ING, in Music: adapting a piece of music so as to be performed on an instrument or instruments different from those for which it was originally composed; as when orchestral or vocal compositions are set for the pianoforte, or the reverse. An arrangement is often a mere lifeless transposition of the original, the only guiding principle being the mechanical possibility of performance. Of this kind are most of the pianoforte arrangements of the orchestral works of Mozart, Beethoven, etc.—partly from the arranger working merely for hire, and partly from a mistaken reverence for, and fear of altering, the original. It is different when an arranger, who thoroughly comprehends the spirit of the original, takes advantage of the peculiar means of expression afforded by the new form of presentation, to reproduce as much as possible the original effects. In this last respect, the arrangements of Franz Liszt have excelled all others, although in some cases he may have overstepped the boundary of propriety. See POT-POURRI: FANTASIA.

ARRANT, a. *ăr'rănt* [AS. *eargian:* OE. *argh*, to be a coward: Ger. *arg*, bad: AS. *earg*, evil (see ARCH 2)]: notorious; impudent; infamous. AR'RANTLY, ad. *-li*. *Note.*—Mr. Skeat says *arrant* is corrupted from Prov. and OE., *arghand*, timid, cowardly, the participle of *argh*, to be cowardly.

ARRAS, n. *ăr'răs* [*Arras*, a town in France where first made]: tapestry; hangings for rooms, woven with figures: see TAPESTRY.

ARRAS, *âr-râs'* (ancient *Nemetacum*): fortified town, cap. of Pas-de-Calais, as it was formerly of the province of Artois, France; on the banks of the Scarpe, partly on an eminence and partly on a plain; consists of four divisions—the city, upper town, lower town, and citadel. It is a principal station on the French Northern railway, distant from Paris by this route 134 m., and from Brussels 97. The houses are of hewn stone; in the lower town they are handsomely built and uniform; the streets straight and wide, set off with several fine squares, and many beautiful public buildings. Among the principal edifices are the Cathedral of Notre Dame, the residence of the prefect, the town-hall, the theatre, and the public library.

A. ranks as a fortified town of the third class, its fortifications being the first that were constructed by the celebrated Vauban, according to his own system. It has been the seat of a bishop since 390, and two ecclesiastical councils have been held here—in 1025 and in 1490.

The corn-market of A. is the most important in the n. of France. Its principal manufactures are iron-ware, woolen and cotton goods, hosiery, lace, pottery, and

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leather. Its trade, which is considerable, is in corn and flour, oil, wine, and brandy, with the industrial products of the city.

It appears from the writings of Jerome that A. was remarkable for its woolen manufactures in his time; and during the middle ages, it was famed for its tapestry; indeed, the name of the town was transferred to this article of manufacture, and *arras* was the name given in England to the richly-figured hangings that adorned the halls of the kings and the barons.

In 1482, A. with Artois was ceded by the states of the Netherlands to Louis XI. of France; but the inhabitants having revolted, the king laid siege to the town, stormed it, and slew or expelled the people, whom he replaced by others brought from all parts of his dominions, ordering the city to be thenceforward called *Franchise*, to obliterate the very name of A. Soon afterwards (1493) it was ceded to Maximilian of Austria, and was possessed by the Spanish branch of the House of Hapsburg till 1640, when Louis XIII. of France took it after a long siege. By the treaty of the Pyrenees, it was finally ceded to France. A. suffered much in the time of the first French revolution, especially in 1793. Robespierre, the Terrorist, was a native of the town. Pop. (1872) 21,447; (1891) 25,701.

ARRAY, v. *ăr-rā'* [OF. *arroyer*, to set in order: It. *arredarĕ*, to get ready: Icel. *reida*, to lay out: Sw. *reda*, order]: to put in order; to prepare or dispose; to dress; to envelop: N. men drawn up for battle; dress. ARRAY'ING, imp. ARRAYED, pp. *ăr-rād'*. ARRAY'ER, n. one who.—SYN. of 'array, v.': to arrange; dispose; dress; attire; apparel;—of 'array, n.': costume; habit; clothing; garments; vesture; raiment.

ARRAY'ER: a title given to certain military officers in England in the early part of the 15th c. There were two in each county, sometimes called Commissaries of Musters.

ARREARS, n. *ăr-rērz'* [F. *arrière*, away, behind: OF. *ariere*, backwards—from L. *ad*, to; *retro*, backwards]: a sum of money past due; what remains unpaid. ARREARAGE, n. *ăr-rēr'āj*, in *OE.*, that which remains unpaid; arrears.

ARREST, v. *ăr-rĕst'* [OF. *arrester:* F. *arrêter*, to detain, to arrest—from mid. L. *ar'restārĕ*, to arrest—from L. *ad*, *resto*, I stop: It. *arrestarĕ*]: to bring one to a stand; to lay hands upon any one, or upon his goods; to make a prisoner of; to stop; to hinder; to restrain; to seize by authority: N. hindrance; restraint; seizure by authority. ARREST'ING, imp. ARRESTED, pp. *ăr-rĕst'ĕd*. ARREST'ER, n., or ARREST'OR, n. *-ĕr*, one who. ARREST'MENT, n. arrest (also, see ATTACHMENT, in Law). ARRESTMENT OF WAGES (see GARNISH—etc.) AR'RESTA'TION, n. *-tā'shŭn* [F.]: an arrest or seizure.—SYN. of 'arrest, v.': to hold: detain; keep; retain; preserve; obstruct; delay; check; hinder; stop; seize; apprehend.

ARREST, in Law: to take into custody under authority of the law, on account of the suspicion or commission of crime, or to answer a demand in a civil suit. In civil

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procedure, A. may be defined as the execution of a judicial or prerogative order, in which the liberty of the person may be restrained, and obedience to the law *compelled;* the actual physical seizure or arrest is not essential; it is sufficient if the party be within the power of the officer, and submit to the arrest. Legal provisions concerning A. vary in details in the different states: but generally are as follows: The A. is made by the properly designated authority; usually by the sheriff or one of his deputies; or, in the case of a process of the U. S. courts, by a marshal. Persons not liable to arrest are—*administrators* in suits on the intestate's premises; *ambassadors* and their servants; *attorneys-at-law; barristers* attending court, or on circuit; *bail* attending court as such; *bankrupts*, under certain circumstances; *clergymen*, while engaged in the performance of divine service; *electors* attending a public election; *executors* sued on the testator's liability; *heirs* sued as such; *members* of congress and the state legislatures, while attending the respective assemblies to which they belong; etc., etc. In criminal cases an A. can be made by any peace officer, as a justice of the peace, sheriff, coroner, constable, or watchman; and in the instance of a felony committed in the presence of the officer, without a warrant; also, on a reasonable suspicion, or where there are grounds for the belief that a felony is about to be committed, or is in preparation; but without a warrant only in the case of a felony. A private person may, and by law he should, make an A. in case of a felony committed in his presence, or during the commission of a breach of the peace, or upon reasonable suspicion that the person arrested is the felon, if a felony has been committed. But the private person so arresting may be held liable unless he be ready to prove the commission of the felony, or the grounds for suspicion. Any person is liable to A. for crime except ambassadors and their servants. An A. may be made by night as well as by day, and for treason, felony, breach of the peace, or generally for an indictable offense, on Sunday as well as other days; and the officer may break open doors, even of the criminal's own house, even to arrest a person therein not the owner, as may a private person in fresh pursuit, under circumstances which authorize him to make the A. An officer authorized to make the A., whether by warrant or from the circumstances, may use necessary force (but he may not strike except in self-defense); he may kill the felon if he cannot otherwise be taken, and so may a private person in making an A. which he is *enjoined* to make. If a warrant (q.v.) has been issued, the proper person to make the arrest is he to whom it was issued, whether named or described by his office. Any wilful obstruction of a lawful A. is deemed a very aggravated offense.

ARREST OF JUDGMENT: in English legal practice, an expedient; now modified in the United States so that a motion for A. of J. has place when a plaintiff is not entitled to a verdict; or, that without such motion, the court may suspend its decision. The effect

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is practically acquittal, though not barring a fresh indictment. See JUDGMENT.

ARRHENATHERUM, *ăr-rhĕn-ăth'ĕr-ŭm:* genus of Grasses, allied to *Holcus* (see SOFT-GRASS) and *Avena* (see

Arrhenatherum:
a, panicle, reduced; b, root and lower part of culm, reduced; c, a single spikelet, natural size.

OAT), and distinguished by a lax panicle, 2-flowered spikelets with two glumes, the lower floret having stamens only, and a long twisted awn above the base; the upper floret perfect, with a short straight bristle below the point.—The name A. is from the Greek *arrhen*, male, and *ather*, an awn. *A. avenaceum* (*Avena elatior* of Linnæus, also known as *Holcus avenaceus*), common in Europe and N. Amer. is called OAT-GRASS, from the resemblance to the coarser kinds of oats in the general appearance of the panicle. In France, it is very much cultivated for fodder, and is often called FRENCH RYE-GRASS, though it has no affinity to the true Rye-Grass (*Lolium*). At the s. it is known as EVERGREEN GRASS. It is a tall perennial grass, 2–3 ft. high, becomes luxuriant early in the season, and continues long productive. It is rather coarse, has a somewhat bitter taste, endures extremes of heat and cold, drought and moisture, is one of the earliest pasture grasses, and also remains fresh late in the autumn. If cured for hay it should be cut early in the season. A variety having a knotted or bulbous base to the stem, instead of a simple fibrous root, called by some botanists *A. bulbosum*, is an inferior grass and a troublesome weed.

ARRIANUS, *ăr-rĭ-ā'nŭs*, FLAVIUS: b. abt. 100, in Nicomedia, Bithynia: a disciple of Epictetus, the Stoic philosopher, whose system he warmly advocated. The learned men of Athens were highly pleased with the earliest prod-

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ucts of his pen, and honored him with the freedom of their city. A. had chosen Xenophon as his model of composition, and hence the Athenians called him the young Xenophon. In 124, he was introduced to the emperor Hadrian in Greece, who conferred on him the freedom of the city of Rome. He was appointed prefect of Cappadocia in 136. Under Antoninus Pius, the successor of Hadrian, he was promoted to the consulship. But some four years afterwards, he appears to have retired from public life, and devoted himself to literature in his native place. As the pupil and friend of Epictetus, he edited the Manual of Ethics (*Encheiridion*) left by his master, and wrote the *Lectures of Epictetus*, in eight books, of which only four have been preserved—to be had in Schweighäuser's *Philosophiæ Epicteteæ Monumenta*, vol. iii. (Paris, 1827). He wrote also *The Conversations of Epictetus*, a work which has been lost, except a few fragments. The most important work by A. is the *Anabasis of Alexander*, or *History of the Campaigns of Alexander the Great*, which has come down to us entire, all but a gap in the 12th chapter of the 7th book. This book, our chief authority on the subject of which it treats, is of great value. In close connection with it, A. wrote his *Indian History*, giving an account of the people of India. Other writings by A., his letter to Hadrian on *A Voyage round the Coasts of the Euxine Sea*, and another, *A Voyage round the Coasts of the Red Sea*, are valuable with regard to ancient geography. There is still another work by our author—a Treatise on the Chase (*Kynegeticos*)—in which, as well as in the *Anabasis*, he has imitated Xenophon.

A. was one of the best writers of his day. His works bear the marks of care, honesty, and correctness; and they were numerous, though several have not been handed down to our time. All that we are possessed of appear to have had translations into Latin. There is a good French translation of the *Anabasis* by Chaussard, with commentary, 3 vols. (1802), also a good one of the *Lectures of Epictetus* by Thurot (1838). The best critical edition of A. is that by Müller (Paris, 1846).

ARRIERE, *ăr-rēr'* [Fr.—from L. *ad*, to, towards; *retro*, back]: of an *army*, the rear; arrears.

ARRIERE-BAN, n. *ăr-rēr'băn* [the French, not understanding the old Teutonic term *heri*, an army, have supposed A. to have the word *arrière* in its composition, which is probably an error]: a general proclamation by which the old French kings summoned to their standard, for the purpose of war, their feudatory vassals, with those also who were in a state of vassalage to them; *fig.*, any general summons issued by an authoritative voice. ARRIERE-FEE, or ARRIERE-FIEF, n. a fee or fief depending on one above it. These fees commenced when dukes and counts, rendering their governments hereditary, distributed to their officers parts of the domains, and permitted those officers to gratify the soldiers under them in the same manner. ARRIERE-VASSAL, n. the vassal of a vassal. ARRIERE-VOUS-

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SURE, n. [Fr. *voussure*, coving]: in *arch.*, a secondary arch, an arch placed within an opening to form a larger one. Sometimes it has the effect of taking off the bearing upon a wooden lintel.

ARRIS, n. *ăr'ĭs* [OF. *areste:* mid. L. *arista*, the outer angle of a house]: in *joinery* and *masonry*, the line or edge of meeting of two surfaces. ARRIS-FILLET, a. triangular piece of wood used to raise the slates or lead of a roof against the shaft of a chimney or a wall, so as more readily to throw off the rain; used also for forming gutters around skylights. It is sometimes called a *tilting-fillet*. ARRIS-GUTTER, n. a wooden gutter shaped like the letter V.

ARRISH, n. *ăr'ĭsh*, ARRISHES, n. plu. *ăr'ĭsh-ĕz:* the Devonshire name for *eddish*, or the grass on stubble fields, and the like. See EDDISH.

ARRIVE, v. *ăr-rīv'* [F. *arriver*, to reach—from It. *arrivare;* mid. L. *adripārĕ*, to come or bring to shore—from L. *ad*, to; *ripam*, shore]: to come to shore; to reach a place; to gain by effort. ARRIV'ING, imp. ARRIVED, pp. *ăr-rīvd'*. ARRIV'AL, n. reaching a place from a distance; the act of coming to.

ARROBA, *ă-rō'bă:* a weight commonly used in Spain, Portugal, Brazil, and the principal Spanish and Portuguese colonies. In the first of these countries, it is equivalent to to the English quarter of a cwt., or 28 lbs.; it is nearly the same in Portugal, etc. In Spain, the A. is also a measure for wine, brandy, etc., and contains four of our quarts.

ARRODE, v. *ă-rōd'* [L. *arrodo*—from *ad*, to; *rodo*, to gnaw]: to gnaw; to nibble. ARRODION, n. *ăr-rō'zhŭn*, act of gnawing, or state of being gnawed.

ARROGATE, v. *ăr'rō-gāt* [L. *arrŏgātus*, claimed as one's own; *ar'rŏgans*, claiming more than one's due—from *ad*, *rogo*, I ask: F. *arroger*, to arrogate]: to claim more than one's due; to assume more than is proper; to prefer a claim in a spirit of pride; to claim undue power. AR'ROGAT'ING, imp. AR'ROGA'TED, pp. AR'ROGANCE, n. *-găns*, or AR'ROGANCY, n. *-găn-sĭ*, or ARROGATION, n. *ăr'rō-gā'shŭn*, or AR'ROGANTNESS, n. the act or quality of taking too much upon one's self; conceitedness; presumption. AR'ROGANT, a. *-gănt*, assuming too much importance; presuming and overbearing; haughty. AR'ROGANTLY, ad. *-lĭ*. ARROGATIVE, a. *ăr'rō-gā'tĭv*, claiming unduly.—SYN. of 'arrogance': presumption; self-conceit; pride; vanity; haughtiness; assumption; lordliness; disdain; conceitedness;—of 'arrogant': overbearing; presumptuous; haughty; assuming; lordly; proud; exorbitant; magisterial;—of 'arrogate': to appropriate; usurp; assume.

ARRONDISSEMENT, n. *ăr-rŏng'dēs-mŏng'* [F.—from *rond*, round—from L. *rotun'dus*, round]: in *France*, a subdistrict or division of a department, or territory, for administrative and judicial purposes. See DEPARTMENT (French).

ARROW, n. *ăr'rō* [AS. *arewe*: W. *aro*, a weapon: Icel. *ǫr*, an arrow: Sw. *hurra*, to hurl]: a pointed and barbed

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weapon of war shot from a bow, not now used in European warfare; a long rod pointed sharply, and barbed. See ARCHERY: BOW AND ARROW. ARROWY, a. *ăr'rō-ĭ*, of or like an arrow. ARROW-HEADED, a. *ăr'rō-hĕd'ĕd*, applied to wedge-like alphabetic figures, very ancient; also called cuneiform. ARROW-SHAPED, a. shaped like an arrow. ARROW-SEED, n. seed shaped like an arrow. ARROW-MAKER, n. a maker of arrows. Arrow-makers were formerly called *fletchers* and *bowyers*, and were deemed persons of importance. ARROW-POISON, poison used by savages to tip their arrows with. That of Central America is curarine. AR'ROW-ROOT', n. a farina or flour, prepared from the roots of the West Indian plants *Maran'ta arundĭnăcĕa* and *M. Indĭca*, ord. *Marantăcĕæ* or *Cannăcĕæ*—perhaps so called from the Indians having employed the root in the cure of wounds made by poisoned arrows. BROAD ARROW, an anc. symbol of rank and authority; the common British government mark placed on their movable property, in the form of a widely feathered arrow, or simply as the broad barb of an arrow, thus— ↑; three wedge-shaped marks diverging from their united points, cut on stones as marks or points, from which measurements are made by the ordnance survey department.

ARROW-GRASS, n. English name of the botanical genus *Triglochin*.

AR'ROWHEAD (*Sagittaria*): genus of plants of the nat. ord. *Alismaceæ*, distinguished by unisexual flowers, having three herbaceous sepals and three colored petals, numerous stamens, and numerous carpels, which are compressed, one-seeded, and on a globose receptacle. They are aquatic plants, natives of very different climates, from the tropics to the cold regions of the world.—The COMMON A. (*S. variabilis*) of N. Amer. varies much in the shape of the arrow-shaped leaves which rise above the surface of the water. It is one of those plants which have had an undeserved reputation as cures for hydrophobia. The corms (or solid bulbs), dried and powdered, have sometimes been used for food, but have an acrid, unpleasant taste.—The CHINESE A. (*S. Sinensis*) is a native of China, and has long been cultivated in that country and Japan for its eatable corms, which in a fresh state are somewhat acrid, but abound in starch. It has arrow-shaped, acute leaves, and a branched polygonal scape (leafless stem). The United States has 7 species and 14 varieties.

ARROW-HEADED CHARACTERS: see CUNEIFORM.

ARROW-HEADS: see ELF-ARROW-HEADS.

ARROW-ROOT: a variety of starch extracted from the roots of certain plants of tropical countries. It is a fine starchy farina, valued as a delicacy, and as an easily digestible food for children and invalids. It is obtained from the tuberous roots—or, more correctly, the root-stocks (*rhizomes*)—of different species of the genus *Maranta*, belonging to the natural order *Marantaceæ*, and characterized by solitary ovules, a fleshy style curved downwards branching stems, and white flowers. The species chiefly

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yielding it is *M. arundinacea*, a native of tropical America, cultivated in the West India Islands, and growing about two ft. high, with ovato-lanceolate, somewhat hairy leaves, clusters of small flowers on 2-flowered stalks, and globular fruit about the size of currants. The roots (or rhizomes) contain a large proportion of farina. They are often more than a foot long, of the thickness of a finger, jointed, and almost white, covered with large paper-like scales. They sometimes curve so that the points rise out of the earth, and form new plants. They are dug up when a year old, washed, carefully peeled, and reduced to a milky pulp. Mills for this purpose have been introduced; but in Jamaica the roots are usually reduced by beating in,

Arrow-root (*M. arundinacea*):
a, tubers; *b*, leaf and flowers; *c*, stamen and style.

deep wooden mortars; in Bermuda, by means of a wheel-rasp. The pulp is then mixed with much water, cleared of fibres by means of a sieve of coarse cloth or hair, and the starch is allowed to settle to the bottom. The water dissolves, and so removes the greater part of the albumen and salts, the starch quickly settling down as an insoluble powder. Successive washings are employed for further purification. The A. is finally dried in the sun or in drying-houses, great care being taken, by means of gauze, to exclude dust and insects. The careful peeling of the roots is of great importance, as the skin contains a resinous matter, which imparts a disagreeable flavor to A.

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with which it is allowed to mix. Great care is taken to preserve the A. from impurities; and the knives used in peeling the roots, and the shovels used in lifting the A., are made of German silver. The West Indian A., most esteemed in the market, is grown in Bermuda; the next, and almost equal to it, in Jamaica. The East Indian A. is not in general so highly valued, perhaps because substitutes for the genuine A. more frequently receive that name. *Maranta arundinacea* is now, however, cultivated to some extent both in in the East Indies and in Africa. *M. Indica*, which was supposed to be distinct from *M. arundinacea*, is now regarded as a mere variety of it, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica. A. is obtained also from *N. Allouyia* and *M. nobilis* in the West Indies, and from *M. ramosissima* in the East.

The amount of fecula or starch present in the roots of the *Maranta* varies according to age, from 8 per cent. in those of the young plant, to 26 per cent. when full grown, at 10 to 12 months old; and the roots then present the following composition in 100 parts:

Starch, fecula, or arrow-root,	26
Woody fibre,	6
Albumen,	1¼
Gummy extract, volatile oil, and salts,	1
Water,	65¼

A. is exported in tin cases, barrels, or boxes, carefully closed. It is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise, like that heard when newly-fallen snow is being made into a snowball. Through the microscope, the particles are seen to be convex, more or less elliptical, sometimes obscurely triangular, and not very different in size. The dry farina is quite inodorous, but when dissolved in boiling water it has a slight peculiar smell, and swells up into a very perfect jelly. Potato-starch, with which it is often adulterated, may be distinguished by the greater size of its particles, their coarser and more distinct rings, and their more glistening appearance. Refined sago-flour is used for adulteration, many of the particles of which have a truncated extremity, and their surface is irregular or tuberculated. A. is also sometimes adulterated with rice-starch and with the common starch of wheat-flour.

Not less than 800,000 lbs. of A. are annually imported into the British Isles. As an article of diet, it is often prepared for invalids and children by merely dissolving it in boiling-water and flavoring with sugar, lemon-juice, wine, etc. It is also often prepared with milk, made into puddings, etc. When most simply prepared, it forms a light meal, which, however, is not very nutritious. See NUTRITION.

A farina somewhat similar to A., and partly known by the distinct name of *Tous les-mois*, is obtained from some species of the allied genus *Canna* (q. v.). But East India A. is in

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part obtained from the tubers of *Curcuma angustifolia*. Other species of *Curcuma* (see TURMERIC), as *C. Zerumbet*, *C. leucorhiza*, and *C. rubescens*, yield a similar farina; the same tubers which, when young, yield a beautiful and pure starch, yielding turmeric when old. In Travancore, this starch is a principal part of the food of the inhabitants. The young tubers of the Galangal (q.v.), (*Alpinia Galanga*), another plant of the same natural order (*Scitamineæ*), are another source of this farina.—A farina somewhat resembling A., and often sold under that name, is obtained from different species of the nat. ord. *Cycadaceæ*, as from the dwarf fleshy trunks of *Zamia tenuis*, *Z. furfuracea*, and *Z. pumila* in the West Indies, and from the large seeds of *Dion edule* in the lowlands of Mexico.—The starch of Cassava, Manihot or Manioc (see MANIOC), is sometimes imported into Europe under the name of Brazilian A. Potato-starch, carefully prepared, is sometimes sold as English A.; and the farina obtained from the roots of the *Arum maculatum* (see ARUM), as Portland A. Otaheite A. is the starch of *Tacca* (q. v.) *pinnatifida*.—All these, as well as Oswego and Chicago corn-starch—the starch of maize or Indian corn—are so nearly allied to true A. as not to be certainly distinguishable by chemical tests; but the forms of the granules differ, so that they can be distinguished by the microscope.

The name A. is commonly said to have had its origin from the use of the fresh roots by the South American Indians as an application to wounds to counteract the effects of poisoned arrows; and the expressed juice has been recently recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles. But it is not improbable that the name is really another form of *Ara*, the Indian name.

ARROYO MOLINOS, *âr-rō'yō mō-lē'nōs:* village in Estremadura, Spain, noted as the scene of Gen. Girard's complete discomfiture by Lord Hill, 1811, Oct. 28. Gen. Girard had been sent out by Soult on a plundering foray with 5,000 men, when he was surprised early in the morning by Lord Hill, who, with two regiments, the 71st and 92d, dashed through the rain upon the enemy, who fled in all directions, leaving behind everything, arms, packs, etc.; 1300 prisoners were taken; the whole artillery, colors, baggage, etc French historians (Thiers, etc.), however, maintain that the battle was 'undecided,' and that their countrymen only retreated in good order, under the pressure of much larger forces.

ARRU ISLANDS, *ăr-rō':* a Dutch possession, of New Guinea, between 5°–7° s. lat., and 134°–135° e. long.; 2,650 sq. m.; pop. 15,000, of whom 400 are Christians, 300 Mohammedans, the remainder heathens. Principal islands are Meykor, Wammer, Udjier, Wokkam, and Babi. Dobo on Wammer is the chief mart. Sago and cocoa nut palms are plentiful, and some tobacco, rice, sugar-cane, maize, and edible roots, etc. are cultivated. The forests yield timber, and the sea yields fish. The rocks give edible nests,

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and the woods shelter wild swine, hares, parrots, pigeons, birds of paradise, etc. Cotton goods, iron and copper-wares, Chinese pottery, beads, knives, rum, and arrack are imported, and bartered for mother-of-pearl, trepang, edible nests, pearls, tortoise-shell, birds of paradise, etc.

ARSACES, *ár'sa-sēz*, or *ar-sā'sēz:* name of several Parthian and Armenian kings. The accounts concerning them which have been transmitted to us by the ancient historians are exceedingly vague and contradictory; and modern criticism has found itself unable to reconcile or simplify the confused statements: see Armenia: Parthia.

ARSE, *árs* [AS., *ars, ears*]: the buttocks or hind-part of an animal.

ARSENAL, n. *ár'sĕ-năl* [OF. *arsenac;* mid. L. *arsĕna*, a place for fabricating arms and naval stores: Sp. and F. *arsenal;* It. *darsena*, and *arsenale*, a dock-yard—from Arab. *dârsanah*, a place of work]: a great military or naval repository, where munitions of war are to some extent manufactured, but more particularly stored until required for use. Every national dockyard, every magazine, every armory, is to some extent an A.; therefore the meaning of the word is not definite. The United States arsenals, armories, and depots (1890), are: Arsenals: Allegheny, Penn.; Augusta, Ga.; Benicia, Cal.; Columbia, Tenn.; Fortress Monroe, Va.; Frankford, Penn.; Indianapolis, Ind.; Kennebec, Me.; New York; Rock Island, Ill.; San Antonio, Tex.; Watertown, Mass.; and Watervliet, N. Y. Armories: National, Springfield, Mass. Depots, ordnance: Cheyenne, Wyo.; Fort Leavenworth, Kan.; Fort Snelling, Minn.; and Vancouver, Wash. Depots, powder: St. Louis, Mo.; Ellis Island, N. Y.; Dover, N. J. In England, Deptford is a storehouse for naval clothing and provisions, and Weedon and the Tower (q.v.) great military repositories; the only establishment vast enough to deserve the the name A. is at Woolwich (q.v.).—In France, the chief arsenals are at Cherbourg, Brest, and Toulon.

ARSENIC, n. *ár'sĕ-nĭk* [L. *arsen'ĭcum;* Gr. *arsen'ĭkon*, arsenic—from Gr. *arsen'ĭkos*, masculine, male—so named from its superior strength]: a semi-metallic element; a poisonous mineral substance, in the form of a white or steel-gray powder, also called ARSEN'IOUS ACID, *-ĭ-ŭs.* ARSENIOUS, a. pertaining to. ARSEN'IC, a., or ARSENICAL, a. *ár-sĕn'ĭ-kăl*, containing arsenic. ARSENICATE, v. *ár-sĕn'ĭ-kāt*, to combine with arsenic. ARSEN'ICA'TING, imp. ARSEN'ICA'TED, pp. ARSENIATE, n. *ár-sĕn'ĭ-āt*, or ARSENATE, n. *ár'sĕn-āt*, a salt of arsenic acid. ARSENITE, n. *ár'sĕ-nīt'*, a salt of arsenious acid. ARSINE, n. *ár'sĭn*, in *chem.*, a body constituted on the plan of a compound ammonia in which the nitrogen is replaced by hydrogen. ARSENIDE, n. *ár'sĕn-īd*, or ARSENIURET, n. *ár'se-nī'ū-rĕt*, arsenic in combination with a metal. ARSENIURETTED, a. combined with arsenic. ARSENOUS, a. *ár'sĕn-ŭs*, pertaining to arsenic, or having it as one of its constituents.

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ARSENIC: popular name for arsenious acid (q.v.), but properly restricted to the metal, symbol As, equiv. 75·0. This is rarely found free in nature, but in combination it occurs largely. See ARSENICAL MINERALS. The metal is generally prepared from Arsenious Acid. As_2O_3, by mixing it with its own weight of charcoal, placing the mixture in a well-covered crucible, and subjecting the whole to heat, when the metal set free by the charcoal rises, and condenses in the upper part or cover of the crucible. Metallic A. is very brittle, can easily be reduced to powder by hammering, or even pounding in a mortar; and when a freshly cut surface is examined, it presents a brilliant dark steel-gray lustre, which, however, readily tarnishes on exposure to the air. The metal, as such, is not considered poisonous, but when introduced into the animal system, it is there faintly acted upon by the juices, and in part dissolved, at the same time, exhibiting poisonous properties. When heated in the open air, it burns with a peculiar bluish flame, and emits a characteristic alliaceous odor. The only use to which the metal A. is applied in the arts is in the manufacture of leaden shot of the various sizes, when its presence in small quantity in the lead renders the latter much more brittle than it ordinarily is. Of all the compounds of A. the most important is the one already alluded to, Arsenious Acid, an oxide of A. With sulphur, A. forms two important compounds: *Realgar*, As_2S_2, a red, transparent, and brittle substance, which is employed in the manufacture of the signal-light called *White Indian Fire;* and *Orpiment*, As_2S_3, or *King's Yellow*, a cheap pigment of a yellow color. With hydrogen, A. forms arseniuretted hydrogen. AsH_3, a very poisonous gas, and one which has been fatal to several chemists.

Native Arsenic.

ARSENICAL MINERALS: chiefly in primitive rocks, frequently associated with other metalliferous minerals.—*Native Arsenic*, although nowhere very abundant, is not unfrequently found in mines in Europe, Asia, and America, usually with sulphur and metallic sulphurets. In Britain, it occurs at Tyndrum in Perthshire. It has usually a fine granular character. It is seldom, if ever, quite pure, usually containing a little antimony and iron, and frequently a very little silver or gold.—A very similar and still rarer mineral, found in similar situations, is known as *Arsenic-antimony*, and consists of about two parts of metallic arsenic, and one of metallic antimony.—*Arsenic-silver*, or *Arsenical Silver*, is another very rare mineral, consisting chiefly of arsenic and iron, but containing also about 13 per cent. of silver and a little antimony.—*Arsenic-glance*, found at Marienberg in Saxony, and containing about 3

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per cent. of bismuth or less, is thought to be an allotropic form of arsenic. *Realgar* (q.v.) is a monosulphide, with 70 per cent. of arsenic (As). *Orpiment* (q.v.) is a trisulphide, with 61 per cent. As. They occur together in the Norris Geyser basin, Yellowstone Park, and in seams in clay under lava, Iron co., Utah. *Dimorphite* (As_4S_3?) is found at a fumarole near Naples. *Domeykite* is a copper arsenide, As 28·3, found at L. Superior. *Niccolite* is a nickel arsenide, As 56·1; it occurs at Franklin Furnace, N. J., Silver Cliff, Colo., and with *Smaltite* (a cobalt diarsenide, As 71·8) in gneiss at Chatham, Conn. *Gersdorffite*, incrusted on galena and sphalerite at Phœnixville, Penn., is a sulph-arsenide of nickel, nearly half As. *Löllingite*, or Arsenosiderite, is an iron-diarsenide, and *Arseniosiderite* (q.v.) is another thing—an arsenic pentoxide compound with iron, lime, and water. *Arsenopyrite* or Mispickel is a sulph-arsenide of iron, sometimes cobaltiferous (*Danite*), sometimes nickeliferous; it is nearly half As. *Safflorite* is, like Smaltite, a cobalt diarsenide, As 79·3; and *Rammelsbergite* is similar, with nickel instead of cobalt. A cobalt arsenide, nearly four-fifths As, is named *Skutterudite*. There are also tellurium and manganese arsenides described, and *Sartorite* is a lead and arsenic compound with sulphur, while *Epigenite* is a sulphide of this with copper and iron. *Arsenolite*, an As trioxide, has 75·8 per cent. of this element; and another, differing in crystallization, is *Claudetite*. Some lead phosphate (*Pyromorphite*) contains As, and *Haidingerite* is lime arsenate; other arsenates are that of manganese, *Allacite;* a more complex one, *Arseniopleite;* and a hydrous ferric one, *Scorodite*. Still other minerals that contain arsenic are *Ecdemite*, *Trippkeite*, *Pitticite*, *Beudanite*, *Atelestite*, etc. Commercial arsenic is derived from ores worked also for nickel, cobalt, etc.

ARSEN'ICAL SOAP: important preparation in Taxidermy (q.v.). Its use is not necessary for the thin skins of the smaller birds and smallest mammals, arsenic in dry powder being sufficient; but for thicker skins it is thought to have more penetrating quality.

ARSENIOSIDERITE, *ár-sĕn-ĭ-ō-sĭd'ĕr-īt* [Gr. *arsen'ikon*, arsenic; *sidēros*, iron]: fibrous mineral found in France and Saxony, the large silky fibres radiating in concretions, like cacoxenite, which it resembles also in yellowish color; its composition answers to arsenic pentoxide, with iron and lime. *Arsenosiderite* differs slightly in spelling from Arseniosiderite, but much in composition ($FeAs_2$); it is now named *Löllingite;* and is the same as Arsenocrocite. It varies from silver white to steel gray, and has varieties such as *Leucopyrite* (Fe_2As_4) and others with a little sulphur or cobalt.

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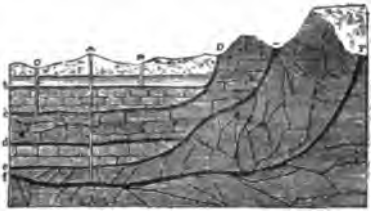
Arquebusier of the Seventeenth Century.



Artesian Well.—Diagram showing pervious strata in a basin-shaped curve. A, B, C, three wells communicating at b, c, d, e, f, with underground pervious strata containing water which descends by gravitation from the higher levels, D, E, F.

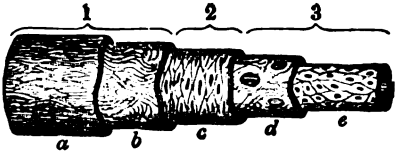


Diagram of the Structure of an Artery.—1, External coat: *a*, fibrous, *b*, elastic; 2, Middle coat: *c*, muscular; 3, Internal coat: *d*, elastic, *e*, endothelial.

Arrow-root (*Maranta arundinacea*): A, Flowering branch; B, Base of flower stem; C, Branch of the rhizome.

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ARSENIOUS ACID: the arsenical compound most familiarly known, popularly called Arsenic. It is obtained principally during the roasting of the arsenical nickel ores in Germany in furnaces communicating with flues. When the arsenic of the ore burns, it passes into the condition of A. A. (As_2O_3), and rising as vapor into the somewhat cool flue, is there deposited as a grayish powder, known by the names of *Smelting-house Smoke, Flowers of Arsenic, Poison-flour*, or *Rough A. A.* In this condition the A. A. is contaminated with some impurities, from which it may be separated by introducing the gray powder into an egg-shaped vessel, and applying heat at the lower end when the A. A. rises in vapor and condenses in the cool end as a transparent glassy or vitreous substance. Ordinary A. A. of the shops (which is what is popularly known as *arsenic*) is a white crystalline powder, which feels decidedly gritty, like fine sand, when placed between the teeth, and has no well-marked taste. It is very heavy, so much so as at once to be noticeable when a paper or bottle containing it is lifted by the hand. It is soluble in water to the extent of 1 part of A. A. in about 100 parts of cold water, and 1 part of A. A. in about 10 parts of boiling water. As ordinarily sold in quantities under 10 lbs. in weight, the A. A. is required by the law of some countries to be colored with $\frac{1}{32}$ of its weight of indigo, or $\frac{1}{16}$ of its weight of soot· the object of the admixture being to render any liquid to which the A. A. might be added, with a murderous intent, of a black or bluish-black hue, and thus indicate the presence of something unusual. In packages of 10 lbs. and upwards, A. A. is allowed to be sold in the pure white crystalline form without coloration. When placed in a spoon or other vessel, and heated, the A. A. volatilizes, and condenses in crystals on any cool vessel held above. By this means it can be distinguished from ordinary flour, which, when heated, would char, and leave a coal behind; and from chalk, stucco, baking-soda, tooth-powder, and other white substances, which, when heated, remain in the vessel as a non-volatile white residue. Again, when A. A. is placed on a red-hot cinder, and the escaping vapors cautiously brought under the nostrils, the strong alliaceous odor characteristic of arsenic is given off. The mode in which A. A. comports itself when thrown upon water is likewise peculiar. Instead of at once descending through the water like sand, the A. A., notwithstanding its great density (sp. gr. 3·70), partially floats on the surface, as wheat-flour does; and that portion which sinks in the water rolls itself into little round pellets, which are wetted only on the outside, and contain much dry A. A. within. The solution of A. A. in water is recognized by three tests:

1. Hydrosulphuric acid and hydrochloric acid produce a *yellow precipitate* of arsenious sulphide, As_2S_3, which is soluble in ammonia.

2. Ammonio-sulphate of copper, an *apple-green precipitate* of arsenite of copper, $CuHAsO_3$.

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3. Ammonio-nitrate of silver, a *yellow precipitate* of arsenite of silver, Ag_3AsO_3,

In many cases A. A. is used as a means of destroying animal life, but, happily, the processes for the detection of the poison in organic mixtures and in the animal tissues are so unerring, that it is hardly within the range of possibility that an animal can be destroyed by the administration of A. A. without very decided evidence of the existence of the poison being obtained on examination of the various parts of the animal structure; indeed, it may be safely said that there is no limit to the detection of the poison, as even after the animal structure has been so far decomposed that little remains, yet still the poison, from its indestructibility, survives, and will indicate itself clearly, on the application of the several tests.

For the isolation and recognition of A. A. in organic mixtures, such as the contents of a stomach, three processes may be followed. The method generally pursued, and that upon which greatest dependence is placed, is called Reinsch's process, from the name of its discoverer. The manner of its application is to treat the organic mixture with water, sufficient to render it thin, then add hydrochloric acid to the extent of one-eighth of the volume of the liquid; apply heat, and when the whole has been raised to near the boiling-point, introduce clean, newly burnished pieces of copper in the form of wire, gauze, or foil. If A. A. be present in the mixture, a steel-gray coating of metallic arsenic will form on the surface of the copper. This apparent tarnishing of the copper may take place when no A. A. is in the mixture, and may be produced by salts of mercury, antimony, etc., as well as by sulphur compounds, and even occasionally by fatty matters. To distinguish between the coating formed by A. A. and that produced by other substances, the copper is taken out of the mixture, washed with water, to remove acid; immersed in ether, to dissolve off any adherent fatty matter; dried between folds of blotting-paper; introduced into the lower end of a dry glass test-tube, and there cautiously heated. The metallic arsenic (As) is driven off by the heat from the surface of the copper, rises in vapor into the upper portions of the test-tube; there meets the oxygen of the air, with which it combines, forming A. A., As_2O_3, and thereafter deposits itself on the inner surface of the cool part of the tube in little glistening crystals. On allowing the tube to cool, adding water thereto, and applying heat, the water dissolves the crystals of A. A., yielding a solution, to separate portions of which the liquid tests mentioned above may be successfully applied. This process may likewise be employed in the detection of A. A. in animal tissue, as in the liver, spleen, kidneys, etc., by first dividing the animal matter into small pieces, and thereafter treating with water, hydrochloric acid, and copper. The precautions which require to be exercised in trying this process are, that the hydrochloric acid and copper are themselves free from A. A. Hydrochloric acid has long been known to be liable to contain at times a very

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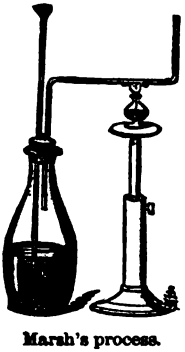
sensible proportion of the poison, and it is therefore necessary, before using the acid in any experiment, to make a preliminary trial with dilute hydrochloric acid, into which when heated a piece of copper is immersed; and if no tarnishing occurs after a quarter of an hour's trial, the acid may be declared free from contamination with arsenical compounds. The liability of copper to contain arsenic assumed importance in connection with a trial in Britain, 1859, Aug., for murder by slow poisoning with arsenic. In this case a considerable amount of copper was dissolved during the testing, and supplied the poison in quantity enough to produce a faint coating on a piece of copper which was subsequently introduced into the liquid. The result was, that A. A. was at first declared to be present in the material under examination; but further experiments demonstrated that the copper itself had afforded the arsenic. To free copper from any arsenic which it may contain originally, it is only necessary to heat the copper over a gas or spirit-lamp flame, when the arsenic volatilizes, and leaves the copper uncontaminated therewith.

The other two processes for the detection of A. A. in organic mixtures are—1. That recommended by Marsh, in which the material is treated with dilute sulphuric acid and metallic zinc in a gas-generating apparatus, when the arsenic,



Marsh's process.

Berzelius's process.

combining with hydrogen, forms arseniuretted hydrogen AsH_3, from which, in the act of escaping, the metallic arsenic, and subsequently A. A., can be obtained; 2. That known as Berzelius's process, in which dry arsenical compounds are mixed with a reducing flux, and heated in a constricted tube, when the metal arsenic is produced, which in its turn is converted into A. A. by heating in a wide test-tube. The processes of Marsh and Berzelius are not so generally followed as that of Reinsch; but in each and all it is absolutely necessary, in order to avoid the possibility of mistake, (1) that metallic arsenic be obtained from the organic

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mixture; (2) that the metallic arsenic be converted into A A.; and (3) that this A. A., treated with water, should yield a solution which will give the three liquid tests mentioned previously.

A. A. forms compounds (salts) with alkalies and other bases, which are called Arsenites. Some of these are employed in commerce and medicine. A. A., boiled with a solution of potash, or carbonate of potash, forms an arsenite of potash, used in medicine, known as *Fowler's Solution*. The more largely used sheep-dipping mixtures are composed of A. A., soda, sulphur, and soap, which, when used, are dissolved in a large quantity of water, and thus constitute essentially dilute solutions of arsenite of soda. A compound of A. A. and the oxide of copper, called the arsenite of copper, or *Scheele's Green*, is a pigment largely used by painters as a pretty and cheap green paint. The same substance is extensively employed in the manufacture of common green paper-hangings for the walls of rooms; and recent investigations show that rooms covered with paper coated with this green arsenite of copper are detrimental to the health of occupants, from the readiness with which minute particles of the poisonous pigment are detached from the walls by the slightest friction, are diffused through the room, and ultimately pass into the animal system. Another green pigment is named *Schweinfurth Green*, and contains A. A., oxide of copper, and acetic acid, and is a double arsenite and acetate of copper.

Arsenic (Arsenious Acid), *Properties of, as a Drug.*—A. has long been used as a medicine. When taken into the stomach, it is soon absorbed into the blood, and circulates with that fluid, exhibiting great power over certain diseases, especially skin diseases, as psoriasis, lepra, eczema (q.v.), etc. It is classed among the tonic minerals, and given for nervous disorders, especially those that are periodic. Of late it has been much recommended for rheumatism; and Dr. Begbie, of Edinburgh, considered that among the remedies for chorea (St. Vitus' dance) it holds the foremost place. In ague, also, and remittent fever, as well as in other disorders originating from the same source, A. and quinine are chief remedies. They are considered to act as alteratives of the blood. The usual method of administering A. is in small doses (from three to five drops) of the liquor arsenicalis, largely diluted with water, twice or thrice in the day. Arsenic is sometimes given combined with iodine and mercury (Donovan's solution).

When given in the doses above mentioned, for eight or ten days, symptoms of poisoning begin to appear; the skin becomes hot, the pulse quick, the eyelids hot and itchy; the tongue has a silvery appearance; the throat is dry and sore, the gums swollen and tender; and if the treatment is persisted in, salivation ensues, and then come nausea, vomiting, diarrhea, nervous depression, and faintness (Begbie). The quantity necessary to destroy life, of course, varies. Dr. Christison records the case of a man who died in six days, after taking thirty grains of the powdered white A.; but a much smaller dose will prove fatal; a girl was

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killed with two grains and a half of A. contained in two ounces of fly-water. According to Dr. Swaine Taylor, a medical witness is justified in stating, that under circumstances favorable for its operation the fatal dose for an adult is from *two* to *three grains*. Death from a poisonous dose of A. may occur in a few hours, or after the lapse of days. A woman, aged 56, used a solution of A. in water to cure the itch; she experienced severe suffering, and died after two years, having had symptoms of arsenical poisoning all that time.

A. has been used frequently as a slow poison, the symptoms being attributed to inflammation of the bowels from natural causes. Fortunately, in most cases its detection is easy. Orfila found A. in the soil of cemeteries, a fact which has created some discussion among toxicologists. A. is used by anatomists as an antiseptic, but is dangerous, as it is apt to get into cuts on the hands, and under the finger-nails, and cause disagreeable symptoms. In Styria, A. is taken by the peasant girls to increase their personal attractions; and it has been ascertained that in other Austrian provinces, A.-eating is largely practiced by men, who nevertheless attain old age—an instance of the tolerance which can gradually be set up against dangerous poison. These ignorant A.-eaters, who generally begin the use of the drug secretly, claim that it improves the complexion, and so strengthens the respiratory organs as to enable bearers of heavy burdens to climb mountains with ease. When the habit is established it cannot be given up; and sudden cessation causes death.

No effective chemical *antidote* for A. has yet been discovered. In case of an overdose or of intentional poisoning, the following treatment is recommended: Evacuate the stomach by the stomach-pump, using lime-water; administer large draughts of tepid sugar and water, chalk and water, or lime-water; avoid the use of alkalies, but administer charcoal and hydrated sesquioxide of iron; take a tepid bath, and use narcotics. If the fatal symptoms be averted, let the patient for a long time subsist wholly on farinaceous food, milk, and demulcents.

ARSENOCROCITE: see ARSENIOSIDERITE.

ARS-FOOT, *ärs'foot:* English name for the Great-crested Grebe (*Podiceps cristatus*). SMALL A., the Little Grebe (*Podiceps minor*).

ARSINOE, *ar-sĭn'ō-ē:* b. abt. B. C. 316: daughter of Ptolemy I., king of Egypt, and of Berenice. She was married in her sixteenth year to the aged Lysimachus, king of Thrace, whose eldest son, Agathocles, had already wedded Lysandra, the half-sister of A. Desirous of securing the throne for her own children, A. prevailed on her husband to put Agathocles to death; the consequences of which crime, however, were fatal to the Thracian monarch; for Lysandra, having fled with her children to Seleucus in Asia, managed to induce him to declare war against her unnatural father in-law. Lysimachus was slain, and Seleucus seized the kingdom. A. now sought

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refuge in Macedonia, which, however, was also taken possession of by Seleucus; but on the assassination of the latter, after a few months, by Ptolemy Ceraunus, the half-brother of A., she received a hypocritical offer of marriage from Ptolemy, who wanted to destroy her two sons, lest they should prove formidable rivals to his ambition. She consented to the union, and opened the gates of the town in which she had taken refuge, but her children were butchered before her eyes. She then fled to Egypt (B. C. 279), where she married her own brother, Ptolemy II. Philadelphus. These unnatural unions subsequently became common among the Greek kings of Egypt. It does not appear that A. had any children by her brother, though she was regarded by him with great affection. He named several cities, and also an entire district, by her name. After her death, he ordered Dinochares, the architect, to build a temple to her memory, and roof the edifice with loadstones, so that her iron statue might seem to float in the air.

ARSIS, n. *ár'sĭs* [Gr. *arsis*, the rise of the voice in a syllable—from *airo*, I raise]: in *poetry*, the accented syllable of a foot, or that on which the stress of the voice is put, the other part of the foot being called the *thesis*; in *music*, applied to the rising and falling of the hand in beating time. It is also applied to the elevation and depression of the voice in speaking.

ARSON, n. *ár'sŏn* [F. *arson*; mid. L. *arsiōnem*, a burning—from L. *arsus*, burnt]: the crime of wilfully setting on fire property. A. (called in Scotland *wilful fire raising*), is, according to the laws of all civilized countries, a crime of the deepest atrocity; for it involves not only destruction of property, but also destruction of, or at least indifference to, the life of others. In the criminal law it is a felony, and has been described in England and some states of the Union as the malicious and wilful burning of the house or building of another man: in some of the states (New York, etc.), it is the setting on fire of any building—even one's own house—which contains a human being, or of any outbuilding whose burning will manifestly endanger such a building. To constitute such felony, there must be an *actual* burning—some wasting of fibre by combustion; for intent, however clear, would not suffice at common law to support a charge of A. The extinguishment of the fire does not bar the charge. Some states declare it to be A. to set fire with intent to defraud an insurance company. In general, U. S. law does not apply the term A. in the case of as many kinds of property as the English law.

ART, v. *ärt* [Icel. *ert:* AS. *eart:* Dan. *er* (see ARE)]: the 2d sing. of the pres. tense of verb *be*.

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ART, n. *ârt* [F. *art*, art—from L. *artem*, an art]: the rules and method of doing a thing well; anything done by human skill—the opposite of *nature;* knowledge applied to the uses of every-day life—the opposite of *science;* a trade; skill; cunning. ARTS, n. plu. a mediæval term used to designate certain articles or subjects of study; a modern art course is 'Latin, Greek, mathematics, moral philosophy, logic, rhetoric, and natural history,' but the subjects vary in different universities. ART AND PART, a share in contrivance and execution. ARTFUL, a. *ârt'fool*, cunning; crafty. ART'FULLY, ad. *-li*, with art or cunning; skilfully. ART'LESS, a. unskilful; natural; simple. ART'LESSLY, ad. *-li*. ART'LESSNESS, n. ART'FULNESS, n. skill; cunning. ARTIFICE, n. *âr-ti-fis* [F. *artifice*—from L. *facio*, I make]: a trick; an ingenious contrivance, in a good or bad sense. ARTIFICER, n. *âr-tif'i-sér*, a workman; a contriver. ARTIFICIAL, a. *âr'ti-fish'ăl*, made by art; not produced by nature; feigned; fictitious. AR'TIFI'CIALLY, ad. *-li*. AR'TIFI'CIALNESS, n. the quality of being artificial. ARTIFICIALITY, n. *âr'ti-fish'i-ăl'i-ti*, appearance or result of art. ART' UNION, *-ün'yün*, a subscription lottery of paintings, engravings, etc. ARTISAN, n. *âr'ti-zăn* [F. *artisan*]: a workman; a mechanic. FINE ARTS, *fin'ârts*, those productions of human skill and genius more immediately addressed to the taste, or to the imagination—such as painting, sculpture, engraving, music, etc. MASTER OF ARTS, in *mediæval times*, one declared qualified to teach students in arts, as *Doctor* was one declared qualified to teach students in theology or in law. DEGREES IN ARTS, academic titles conferred on persons after a certain university course of study, and a strict examination in the subjects of that course, the lower degree being Bachelor of Arts [B.A. or A.B.], and the higher, Master of Arts [M.A. or A.M.].—SYN. of 'art': knowledge; learning; erudition; literature; science; skill; readiness; adroitness; dexterity; trade; business; profession; contrivance; calling; artifice; cunning; deceit; tact;—of 'artful': cunning; deceitful; adroit; crafty; dexterous; skilful; designing; artificial; fictitious;—of 'artificer': artisan; artist; mechanic;—of 'artifice': trick; finesse; stratagem; subterfuge;—of 'artless': unaffected; sincere; candid; guileless; frank; open; simple; undesigning.

ART, in the sense of FINE ART: a production (or the science or practice of such production) of human skill or genius more immediately addressed to the taste or imagination; distinguished from the useful arts, or the industrial operations for supplying the common necessities of life. Painting and Poetry are fine arts; Agriculture, Navigation, and Medicine are useful arts.

Omitting here the profound impulse of A., a soul-striving after the perfect, we consider it only as pleasurable. Many enjoyments no artist would think of attempting to provide. The gratifications of eating and drinking, of exercise and repose, warmth and coolness, form a class in contrast with the pleasures of music, sculpture, or the drama. It is a matter of nicety to draw the line between

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these two regions of pleasurable susceptibility; indeed, a precise line is not drawn. Certain peculiarities can be assigned as disqualifying circumstances, such that any mode of pleasure laboring under them is debarred from entering into A.; but after these are allowed for, there will remain a disputed border-land, on which no general criterion will hold.

The various indulgences called sensual are examples both of original contrast, and of possible blending by ideal presentation, with the pleasures of A. In the first place, as man's frame is constituted, these bodily functions, while incidentally ministering to his pleasure, are in the main subservient to maintaining his existence, and being in the first instance guided for that special end, they do not necessarily rank among gratifications as such; in the second place, they are connected with the production of what is repulsive and loathsome, which mars their purity as sources of pleasure; and in the third place, they are essentially confined in their influence to the single individual; for the sociability of the table is an element superadded. Now, a mode of pleasure subject to one or more of these three conditions may belong in an eminent degree to the list of utilities, and constitute an end of industry, but does not come under the class now considered. Wealth is disqualified by the third condition, inasmuch as, while in the shape of money, it is confined to some single proprietor. The same may be said of the pleasures of Power and Dignity. Even Affection is too exclusive to come under the artistic head. Anything so restricted in its sphere of action as to constitute exclusive individual property, and give occasion to envy and jealousy, is not a pleasure aimed at by the producer of Fine A.; for there do exist objects that can give delight as their primary end, that have no disagreeable or revolting accompaniments, and whose enjoyment is not restricted to a single mind; all which considerations obviously elevate the rank of such objects in the scale of human enjoyments. The landscape, the glowing sunset, the song of the lark, the flowers of the field and the garden, yield unalloyed pleasure, and create no monopoly. The painter, sculptor, and musician aim at corresponding effects.

The eye and the ear are the chief avenues of artistic delight; the other senses are more or less in the monopolist interest. Moreover, one important feature in the somewhat capricious attribute termed *refinement* attaches more particularly to the objects of these two senses; namely, the power of protracted enjoyment without fatigue. A *coarse* effect is one that is intense and pungent, but too exhausting to be kept up; such is a noisy clash of loud instruments in a musical performance, or a tale of overdone marvels. To remove all the fatiguing accompaniments, and thereby tone down the exciting influence, while retaining as much as possible the really pleasurable part, is to refine upon the effect, and produce a higher work of art. Now, in the sensations of taste and smell generally, the stimulus is apt to be of short duration, the pleasure is said

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to pall soon. Yet there are degrees in the case; some of the choicer odors can for hours together produce a gentle and pleasing sensation. But it is the ear, and perhaps still more the eye, that can remain open to agreeable stimulation for the greatest length of time; and in this fact, with the unconsuming nature of their objects, the artist finds good reasons for striving earnestly towards the gratification of those two senses.

The sensual elements can be brought into A. by being contemplated in the *idea*, in place of being enjoyed in the reality. A painter or poet may depict to the mind a feast, and impart a pleasure that differs essentially from the delights of eating and drinking. The imagined repast has nothing to do with present bodily necessities; the disagreeable accompaniments can be kept out of view; and any number of persons may share in the effect. So with the elements of wealth, power, dignity, and affection, which in their actuality lack the liberal character of the true artistic delight; when pleasure can be derived from the spectacle of them in the hands of the select number of their possessors—pleasure apart from a rising of selfish desire—then they become an enjoyment that can be shared by the general multitude, like the blue sky or the towering peak. It is the fact that mankind find a charm in contemplating the wealthy, the powerful, the elevated, the illustrious, the beloved; and accordingly such elements are freely adopted into artistic compositions.

If all the sensual gratifications could become artistic by being contemplated in idea, or merely thought of, as in the above case of imagining a rich feast, aside from the rising of desire, there would exist the means of distinctly circumscribing the select region of the beautiful or artistic, and of resolving a difficult problem. It would be admissible for the poet or painter to suggest any of those inferior pleasures to the mind by descriptive touches, and he would thereby elevate them into the region of art. But it is found that every mode of sensual gratification is not open to this merely ideal presentation, since the ideal is instantly seized as the vehicle for desire, and so becomes subjected and practically effaced in the sensual. Even as regards eating and drinking, exception is taken against the too free allusion to those pleasures; while the sensuality of love is hardly to be suggested through the most distant allusion. The reader may revel in tales of mere tender emotion—of parental love and of pure affection—but those other subjects are kept at the utmost distance; and he would be said to be revelling in sensuality, if he were merely to indulge in the imagination of those species of delight. There is, therefore, no other course but to recognize that there are limitations which, whether original in man's nature or not, have become established among his actual and continuing relations—limitations of the sphere of the artist, rendering it quite impossible, at the present stage of man's development, to draw any clear and universal boundary-line between the beautiful and agreeable generally.

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Sublimity, Beauty, Grace, Harmony, Melody, Pathos, Ideality, Picturesqueness, Proportion, Order, Fitness, Keeping, and the Ludicrous—though they do not all relate to the so-called *beautiful*, are all involved in the circle of pleasure now under consideration; and it is obvious that no one fact can run through this variety of designations. There must be a great multitude of agents operating to produce these different impressions, which are related to one another only by attaching in common to the æsthetic class of compositions. Doubtless, several of these names may be employed to mean the same thing, being, in fact, partially synonymous terms; as Beauty and Grace—Proportion, Fitness, and Keeping; but hardly any two terms are synonymous throughout, and there are distinct conceptions implied in Sublimity, Beauty, Picturesqueness, Fitness, and the Ludicrous.

Among the elementary sensations and emotions of the human mind that are of a pleasurable kind, a certain number may enter at once into the composition of A.; such are the pleasures of sound and sight, the emotion of surprise, and plot-interest. Others may enter by ideal presentation; as the gratifications of the remaining senses, and the emotions of fear, tenderness, irascibility, power. The feelings more specific to A. are those produced by Harmony under its various aspects. When sweet sounds are harmoniously combined, we have the musical art; the painter has a similar aim in reference to colors and forms; and so through all the Fine Arts this quality is found recurring as the crowning work of the artistic hand. Nothing is so indisputably included within the circle of the æsthetical or beautiful as finely struck harmonies, melodies, or concords. Whatever else may be included in a composition, it is the admission of these that gives the specific charm, although it would be a mistake to dispense with other elements of interest common to art and to every-day life. Story is essential to Romance and Poetry; sweetness in the separate sounds is requisite for good Music; and color in itself imparts æsthetic pleasure apart from harmonious union.

The agreeable effect designated by Fitness takes rank with the artistic pleasures; we may call it the æsthetic of the useful. When a work is not only done effectually, but done with the appearance of ease, or the total absence of restraint, difficulty, and pain, a delight is experienced quite different from the satisfaction growing out of the end attained. Much of the pleasure of architectural support is referable to this source.

Among the susceptibilities touched by artistic arrangements is the sense of Unity in multitude, arising when a great number of things are brought under a comprehensive design, as when a row of pillars is crowned by a pediment. The use of simple figures—the triangle, circle, square, etc.—for inclosing and arranging a host of individuals, has the tendency to make an easily apprehended whole out of a numerous host of particulars. In all large works abounding in detail, the mind craves some such compre

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hensive plan, whereby to retain the total, while surveying the parts. A building, an oratorio, a poem, a history, a dissertation, a speech, should have a discernible principle of order throughout, the discernment of which gives an artistic pleasure, even in works of pure utility.

The craving for Variety and Novelty is a powerful impulse of the human mind, and makes itself especially apparent in the appreciation of works of A. The greatest works cease to please after a time, and temporary fashion may occasionally lord it over the perennial in taste.

The Fine Arts, individually considered, may be divided into two classes, by drawing a distinction of some importance as regards the question of an artistic *standard*. One class contains the *effusive* arts, or those which consist of mere outbursts of the inward spontaneity, regulated by the effect of the display on the sense of the beholder or listener. Music is a good example. The spontaneous effusions of the human voice, and those prompted by the various emotions, are corrected and tuned by the ear into melody and harmony, and after this process has been often repeated, pleasing airs and compositions are the result. It is the same with the Dance, considered as a fine art. In like manner, dramatic gesture and display, and the graces of elocution and fine address, are the natural promptings rendered pleasing by being changed and modified for that express end. The first movements are mere random, but the delicate sensibility of the beholder causes some to be suppressed, and others brought out, until a really pleasing combination is attained. Contrasted with the purely effusive are the so-called *imitative* arts, or those that involve the representation of some of the appearances of the outer world. Such are Painting, Sculpture, and Poetry. In these, the artist, while still aiming at pleasing effects, is trammelled with a new condition—namely, a certain amount of fidelity to his original. In the others, there are no originals, other than those whose existence is only that of natural ideals of harmony in the mind. The musician imitates nothing; and is bound by the sole condition of gratifying the ear; but a painter chooses his subject from nature, and although he must contrive to yield the pleasures of color, outline, and grouping, he must do so with a certain respect to the object copied. The poet, in depicting the life of men, comes under the rule of fidelity to this extent, that an obvious misrepresentation is apt to give a painful shock, and mar the pleasure that would otherwise be derived from the poetry itself. It is not so much that truth is a part of the artist's pleasure, as that falsehood is a stumbling-block in the way; for even the imitative arts are so only in part. There is no imitation in the metre and cadence of a song, yet these often constitute its main charm. So a certain license of fantastic effusion is allowed to poets, subject to no rules but the giving of pleasure. The creation of imaginary worlds, when avowed, is not objected to; and the criterion of fidelity to the actual is accordingly laid aside for the time. The various arts of Decoration and Design are for the most part effusive,

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although occasionally imitative. Architecture is not in any way imitative; the coincidence between the gothic roof and the intermingling foliage of a double row of trees is mere accident.

These observations are necessary in order to qualify the current maxim, that Nature (as known in actual operation) is the artist's standard, and Truth (as developed in facts) his chief end; conditions that, in their strictness, apply only to science, and to science in its more outward domain as physical. It is the scientific man that should never deviate from nature, and should care for truth above every other consideration. The artist's standard is *feeling*, his end the refined ideal; he may go to nature, as known in operation, but it is to select what chimes in with his feelings of artistic effect, and pass by the rest. He is not bound to adhere to what nature shows him even in her choicest displays; his own taste being the touchstone, he alters the originals at his will: he has right to claim knowledge of a higher 'nature' than is yet visible to him. The student of physical science, on the other hand, must embrace every fact with open arms. If a nauseous fungus or loathsome reptile meet the eye of a naturalist, he is bound to record it as faithfully and minutely as he would dilate on the violet or the nightingale. When a painter adopts the human figure as a basis for setting forth harmonies of color, beauties, and form, and picturesqueness of grouping, he ought not to jar the universal sense of consistency by a wide departure from the usual proportions of humanity. Still, the observers do not look for anatomical exactness; they know that the studies of an artist do not imply the knowledge of a professor of anatomy; but they expect the main features of the reality to be adhered to. In like manner, a poet is not great because he exhibits human nature with literal fidelity to its actual development in operation; to do that makes the reputation of a historian or mental philosopher. The poet works by his metres, his cadences, his touching similes, his graceful narrative, and his exaltation of reality into the region of ideality, and if in all this he avoids serious mistakes and gross exaggerations, he succeeds in his real vocation, which is to give glimpses of a possible nature of a grade higher than has yet been reached in the actual. It is imperative, however, that he keep his grand ideal within limits where it can be identified as still one with the natural.

The attempt to reconcile the artistic with the true (or actual)—art with nature as known—has given birth to a peculiar school, in whose productions a restraint is put upon the flights of pure imagination, and which claims the merit of informing the mind as to the realities of the world, while gratifying the various emotions of taste. Instead of the tales of Fairyland, the Arabian Nights, and the Romances of Chivalry, we have the modern novelist, with his pictures of living men and manners. In painting, we have natural scenery, buildings, men, and animals represented with scrupulous exactness. The sculptor and the painter exercise the vocation of producing portraits

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that shall hand down to future ages the precise lineaments of the men and women of their generation; hence, the study of nature has become an element in artistic education; and the artist often speaks as if the exhibition of facts were his leading purpose. It is probably this endeavor to subject the imagination more strictly to the conditions of visible reality, that has caused the singular inversion whereby the definition of science is made the definition of art.

But while fidelity, in the imitative class of arts, is to be looked upon, in the first instance, as avoiding a stumbling-block rather than constituting a charm, there are still certain ways wherein we derive from it a sort of pleasure that may be called æsthetic. We feel drawn by fellow-feeling towards one who has attended to the same objects as ourselves, or who has seized and put into vivid prominence what we have felt, without ever having expressed. The coincidence of mind with mind is always productive of the agreeable effect of mutual sympathy, and, in some circumstances, there is an additional effect of pleasing surprise. Thus, when an artist not merely produces in his picture those features of the original that strike every one, but includes all the minuter objects that escape the notice of the generality, we sympathize with his attention, we admire his powers of observation, and become, as it were, his pupils, in extending our study and knowledge of nature and life. We feel a pungent surprise at discovering, for the first time, what has been long before our eyes; and so the minute school of artists labor at this species of effects. Moreover, we are brought forward as judges of the execution of a distinct purpose; we have to see whether he that is bent on imitation does his work well or ill; and if our verdict is favorable, our admiration is excited accordingly. There is, too, a certain exciting effect in the reproduction of some appearance in a foreign material, as when a plain surface is made to yield the impression of solid effect, and canvas or stone imitates living humanity. Finally, the sentiment of reality, as opposed to fiction or falsehood, appealing to our practical urgencies, disposes us to assign a value to every work in which reality is strongly aimed at, and to derive an additional satisfaction when fidelity of rendering is induced upon the charms peculiar to A. Thus imitation—which, properly speaking, is a mere accident attaching to Sculpture, Painting, and Poetry, and has no place in Music or Architecture—may become the centre of a small group of agreeable or acceptable effects. These effects are the more prized, because we have been surfeited with the purely æsthetic ideals. We turn refreshed from the middle-age romance to the graphic novel of our own time.

Besides being a source of pleasure, art is frequently spoken of as having an elevating and refining influence on the mind and character; for which reason it is considered a proper object of public encouragement in civilized communities. This elevating influence is owing to the higher nature of artistic pleasure as above described,

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the taste for which helps to rescue mankind from the exclusive dominion of sensual and selfish enjoyments. This beneficent influence has not been realized when art has been degraded to the service of the sensual. Further, it must be admitted that the devotion to art may be itself excessive, and have the effect of withdrawing men too much from the urgency of practical life, rendering them a prey to political despotism, as well as indifferent to moral principle.

See ÆSTHETICS: also the authors named in that article. See also Bain on the *Emotions and the Will;* Herbert Spencer; Ruskin: Lotze; Schasler.

ART, HISTORY OF: a portion of the history of civilization. As regards each particular people, the history of their efforts to conceive and express absolute perfection, or what is commonly called ideal beauty, in form and color, is one of the chief tests of the stage of progress which they have attained. Nor is it as an indication of their command over physical nature, of the abundance of their external resources, or even of their intellectual activity alone, that the history of the art of a people is thus important. It exhibits their moral and even, in a certain sense, their religious position, for the inseparable connection between the beautiful and the good is in no way more clearly manifested than in the fact that the first inroads of demoralization and social disorder are invariably indicated by a diminution in the strength and purity of artistic forms. It has been usual to include under the term history of art the history of the arts of form only, including architecture, but excluding poetry and music, though these latter are generally included when we speak of the fine arts. See ART.

The classical nations of antiquity were not insensible to the importance of tracing the development of that rich artistic life which they had originated, and we accordingly find the germs of artistic history in Pliny, Quintilian, Pausanias, and others. In the middle ages, every trace of a general historical treatment of art disappears, though casual remarks and incidental notices on the subject of artists and the arts are abundant, particularly in such works as the *Liber Pontificalis* of Abbot Anastasius, commonly known as 'the Librarian,' in consequence of his having filled that office at the Vatican in the 9th century. But a history of art, in the sense which we have here assigned to the term, made its appearance in the world for the first time on the revival of letters, in the 15th and 16th centuries; when the artistic treasures of the heathen world, which had come upon mankind as novelties, were brought into contrast with that peculiar type which art had assumed under Christian influences during the middle ages, on the one hand (see BYZANTINE ART), and on the other with that rich harvest of fresh invention which ripened during the long lives of Leonardo da Vinci (q.v.) and Michael Angelo (q.v.), in the period of which Raphael's (q.v.) short career may be regarded as the noon-day. While Vasari (q.v.) traced the great epochs of Italian art from

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only a biographical point of view in his celebrated work, the students of classical literature collected such expressions of opinion on artistic subjects as the writings of the ancients contained, and Palladio, Ligorio, Vignola, and others measured ancient buildings and their constituent members. In this way a vast mass of information on artistic subjects was brought together. But though the materials which might have served for a history of art were thus supplied, it was long afterwards that any proper historical treatment arose; and the knowledge of ancient art which had been gained was applied to their respective purposes by artists on the one hand and philologists on the other. As regarded modern art, the biographical method of Vasari was adhered to, and to this circumstance we are indebted for the innumerable artistic anecdotes which have been preserved. The remarkable variations in style which exhibited themselves between the 16th and 18th centuries gave rise to a species of historical treatment which had for its object the discovery of the common features by which the artists of the respective periods were distinguished. But the history of style, strictly speaking, begins with Winckelmann (q.v.), who was the first to divide ancient art into epochs, and to trace its connection with the general history of human progress. It was from this period that the history of art came to be regarded as a branch of the history of civilization. Even where the biographical method continued to be followed, it was henceforth with this difference, that the division into schools took the place of mere chronological arrangement. The strongly classical tendency which exhibited itself towards the end of the last century, and the romantic reaction and consequent admiration for the middle age which succeeded, though both must be regarded as one-sided influences, had an unquestionable effect in calling attention to what was really great in the artistic productions of these respective periods; and during the present century, the history of art has gradually assumed a more important place as a department of general history. In only very recent times, however, has a complete artistic history appeared in Kugler's *Handbook of the History of Art*, partially translated into English, and edited by Sir Charles Eastlake. In the original work, which is excellent, the immense mass of material that the subject offered has been arranged in periods, and treated in such a manner as to present a sketch complete in itself, while its connection with and dependence on general history, social, political, and philosophical, are carefully indicated throughout. With Kugler's history, that of Schnaase is to be mentioned—a work giving a philosophical and historical account of the origin of the various styles, and their connection with each other; as also the works of Lübke, Springer, and Carriere. Kinkel's history of Christian art has unhappily remained incomplete. Waagen, Passavant, Reumont are well-known authors. There are many other historical works of importance on special departments and separate schools of art, monographs such as

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Stirling-Maxwell's *Annals of the Artists of Spain*, and *Velasquez and his Works*; Ruskin's *Modern Painters*; Crowe and Cavalcaselle's *Hist. of Painting in Italy*, and their *Raphael*; Mignaty's *Le Corrège*; Murray's *History of Greek Sculpture*. See PAINTING: SCULPTURE.

ARTA, *âr'tâ*, or NAR'DA, ancient *Ambracia*: a town in Epirus, ceded by Turkey to Greece, 1881: on the w. line of the new frontier, about 7 m. from the gulf to which it gives name, and 39 m. s. from Janina. It is on the left bank of the river Arta, the ancient *Aracthus*. It is the see of a Greek bishop; has a considerable trade and manufactures, chiefly of cloths and leather; but suffers greatly from malaria. The town has never recovered from the disasters of 1828, when it was stormed by the Greek patriots under Marco Botzaris. Portions of the old walls and foundations of the Acropolis are the only relics of Hellenic times. Remains of the lower empire exist in a convent founded 845 by the empress Theodosia. Pop. (1893) 4,535, two-thirds Greeks.

The ancient city of Ambracia, founded by a Corinthian colony about B.C. 635, was at one time a flourishing independent state, with a considerable territory. It was ruined by the Amphilochians, and became subject to Philip of Macedon. Pyrrhus made it the capital of Epirus; afterwards it fell into the hands of the Ætolians, and then of the Romans.

AR'TA, GULF OF: an arm of the Ionian Sea, 25 m. long and 10 wide, between Greece and Turkey. Until 1881 the whole of the n. coast was Turkish; but in that year the portion e. of the river Arta was ceded to Greece. It was arranged that the gulf should be neutral, the fortress commanding the entrance to the gulf on either side being disarmed. Under its ancient name of the Ambraciot Gulf, it separated Epirus and Acarnania.

ARTABAZUS, *âr'tă-bā'zŭs:* name of several distinguished Persians in the times of the Achæmenidæ. When Xerxes advanced against Greece, one commander named A. led the Parthians and Chorasmi. At a later period he warned Mardonius, but in vain, against engaging in battle at Platæa; and on the first indications of defeat, he withdrew his own division, amounting to 40,000 men, from the field, and succeeded, though with great difficulty, in forcing his way through the wilds of Thessaly, Macedonia, and Thrace to Byzantium, where he crossed to Asia. Subsequently, he acted as negotiator between the Spartan Pausanias and Xerxes.

Another ARTABAZUS was general under the Persian king, Artaxerxes Mnemon, and revolted against Artaxerxes Ochus B.C. 356. For this offense he appears to have been forgiven: and subsequently we find him accompanying King Darius after the battle of Arbela. Alexander rewarded his fidelity by appointing him satrap of Bactria.

ARTABOTRYS, *âr-tă-bō'trĭs* [Gr. *artaō*, to fasten; *botrus*, a cluster of grapes—so called because it possesses

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tendrils]: genus of plants belonging to the order *Anonaceæ*. *A. odoratissima*, or Sweet-scented A., is a beautiful Chinese plant, which makes a fine covering for walls.

ARTAGUETTE, *âr-tâ-gĕt':* d. 1736; b. France: soldier. He accompanied Bienville, the colonial French gov. of La., to America, and was employed in subjugating the Indians. His success in overcoming the great Natchez tribes was rewarded with the command of the Ill. and Wabash regions. When Bienville determined to punish the Chickasaw tribe for joining English traders and interfering with the commercial interests of the French on the Mississippi river, he gave A. command of an expedition consisting of 50 French troops and more than 1,000 friendly Indians. In 1736, June, A. descended the Mississippi river with his Indians, and when within striking distance of the Chickasaw stronghold, established a concealed camp, and awaited the arrival of the troops from New Orleans. For some cause the troops did not appear, and he reluctantly ordered an attack on the Chickasaws, doubting his ability to longer restrain his allies. His Indians captured two strongholds, and in attacking the third A. was twice wounded, and when he fell his followers fled, excepting a Jesuit priest who remained to dress his wounds. After the retreat, the Chickasaws burned A., the priest, and their other prisoners at the stake.

ARTANTHE: see MATICO.

ARTAXA, *âr-tĭks'a*, or ARTAXIAS, *âr-tăks'ĭ-as:* name of three kings of Armenia. A. I. was a gen. under Antiochus the Great, and when the latter was defeated by the Romans made himself independent in Armenia and founded the kingdom, B.C. 190. A. II. was chosen king after his father had been dethroned and taken by Mark Antony to Alexandria B.C. 34; was expelled by the Romans; reinstated by Phraates IV. of Parthia; and murdered by his nobles for his cruelty. A. III., whose original name was Zeno, was a son of the king of Pontus, and was placed on the throne by the Romans A.D. 18.

ARTAXATA, *âr-tăks-â'tâ:* strongly fortified city in Upper Armenia, said to have been built by Annibal for King Artaxias. It was burned by Corbulo; rebuilt by Tiridates, who renamed it Neronea, in honor of Nero; and was afterward known as Ardesh.

ARTAXERXES, *âr'tăks-érks'ēz:* the name of several kings. A. I., surnamed *Longimanus*, second son of Xerxes, escaped from the conspiracy of Artaban and others, and ascended the throne B.C. 465. His long reign, extending to 425, was marked by a decline of power.

ARTAXERXES II., surnamed *Mnemon*, succeeded his father, Darius II., B.C. 405. After gaining the victory over his brother Cyrus, he became involved in war with Sparta, which ended with the Antalcidean Treaty of Peace: he d. 361.

ARTAXERXES III. surnamed *Ochus*, son and successor of A. II., reigned in the true style of oriental despotism until B.C. 338. One of his most daring exploits was in

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Egypt, where he caused the divine bull Apis to be slaughtered and cooked as ordinary beef. A. III. was poisoned, 338, by his eunuch Bagoas. It is said that his flesh was eaten by cats, and that hilts for scimitars were made of his bones.

The founder of the new Persian dynasty, or the Sassanidæ (which ruled A.D. 226–651), was named Artaxerxes.

ARTEAGA, *ăr-tā-ā'gâ*, ESTEBAN: d. 1799: b. Madrid: historian. He was educated for a Jesuit priest, and was engaged in missionary and educational work in Spain till the suppression of his order, when he removed to Italy. His best-known publication is a history of the Italian lyrical drama, *Le Rivoluzioni del Teatro Musicale Italiano*, 2 vols. (Bolonga 1783).

ARTEAGA, JOSÉ MARÍA: about 1830–1865, Oct. 21; b. Aguas Calientes, Mexico: soldier. Born of poor parents, he received a common-school education, and was apprenticed to the tailor's trade. About 1850 he was appointed a sergeant in the army, and serving through the various revolutions had attained the rank of gen. at the time of the French invasion. He rendered important service in fighting the French army supporting Maximilian till the battle of Amatlán, where he was captured, after which the French, fearing his military skill, shot him at Uruapán.

ARTEDI, *ăr-tā'dē*, PETER: 1705, Feb. 22—1735, Sep. 21; b. at Anund, province of Angermannland, Sweden: celebrated naturalist. He was at first designed for the priesthood, and entered the Univ. of Upsala, to pursue the usual course of philosophy and theology; but he soon betook himself to medicine. In 1728, Linnæus went to Upsala to study the same science, and intimacy sprung up between the young men. They worked together, and to a certain extent, on the principle of a division of labor. Physiology, chemistry, and mineralogy they pursued in common; but to this A. added ichthyology, and Linnæus ornithology and entomology. In 1734, A. sailed for England, and Linnæus went to Lapland, each having made the other his heir and executor of all his scientific documents. While in London, A. wrote the preface to his *Ichthyologia*. Next year he went to Leyden in Holland, where he found Linnæus just arrived from the north. Each showed the other the results of his labors. A.'s career was abruptly ended by his falling into one of the canals near Amsterdam.

A.'s only complete work is the *Philosophia Ichthyologica*. The *Synonymologica* is described as a work of extraordinary labor, but somewhat confused. Linnæus faithfully performed his duty as his friend's executor. He arranged, corrected, and completed his manuscripts, and published the whole, together with the life of the author, in 1738. According to Cuvier, the great work of A. is the first named, which gave a truly scientific character to the study of fishes. The only error of any magnitude which occurs in it is including the Cetaceæ among fishes. A. was also a distinguished botanist. He was the first to indicate, as a

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special characteristic, the presence or absence of involucra in the umbelliferous plants, whose species are so difficult to distinguish from each other. Linnæus has called a genus of these, in memory of his friend, *Artedia*.

ARTEMIA, *ăr-tē'mĭ-ă* [Gr. *Ar'temis*, Diana]: genus of *Entomostracans* belonging to the family *Branchipodidæ*. The *A. salina*, or Brine Shrimp, loves water so salt that most other marine animals die in it. At the salt-pans, at Lymington, Eng., the workmen call them *brine-worms*.

ARTEMIS: see DIANA.

ARTEMISIA, *ăr-tĕ-mĭsh'ĭ-a*: Queen of Caria (reigning B.C. 352–350): wife of Mausolus, and celebrated for the magnificent mausoleum which she caused to be erected to her husband's memory. See MAUSOLEUM.

Another ARTEMISIA, queen of Halicarnassus, accompanied Xerxes in his expedition against Greece, and distinguished herself at the battle of Salamis (B.C. 480); she ended her life in consequence of an unfortunate attachment, by leaping from a rock.

ARTEMISIA, n. *ăr'tĕ-mĭzh'ĭ-ă* [*Ar'temis*, one of the names of Diana, who presided over women in child-bed]: genus of plants of the nat. ord. *Compositæ*, sub-order *Tubuliflorœ*, in which the flowers of the disk are hermaphrodite, those of the ray in one row, the bracts forming a roundish imbricated head, the receptacle naked or hairy, the achenia obovate, and destitute of pappus. The heads of flowers are numerous and small; the leaves are generally much divided. There are many species, herbaceous plants and shrubs, natives chiefly of temperate regions. They have generally an aromatic smell, more or less agreeable, and a warm, sometimes acrid and bitterish taste.—To this genus belongs WORMWOOD (*A. Absinthium*), the *Apsinthion* of the ancient Greeks, to whom its medicinal properties were well known. It is a native of Britain, the continent of Europe, and the northern parts of Asia and America, growing in waste places, by waysides, etc. It is a perennial, 2 to 4 ft. high; its leaves bipinnatifid and clothed with a silky down, and its small hemispherical drooping heads of flowers are of a dingy yellow color, and are produced in axillary panicles. It is aromatic and bitter, containing a bitter principle and an essential oil, both of great strength, upon account of which it is used in medicine in various forms (oil, extract, tincture, etc.), as a stomachic and anthelmintic or vermifuge. It was formerly in much use as a febrifuge. It is frequent in gardens, occupying an important place in the domestic pharmacopœia, and is an essential ingredient in a number of compound medicines. Its roots, and those of some other species of this genus, have been recommended in epilepsy.—SEA WORMWOOD (*A. maritima*, including a variety which has been called *A. Gallica*), a native of salt-marshes

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in Britain and other parts of Europe, has similar properties, and is occasionally used for the same purposes; also ROMAN WORMWOOD (*A. Pontica*), a native of the middle and south of Europe, but not of Britain—TARTARIAN WORMWOOD (*A. Santonica*), a native of Tartary, Persia, and other parts of the East; and INDIAN WORMWOOD (*A. Indica*), a native of the Himalaya, abounding at

Wormwood (*Artemisia Absinthium*).

elevations of 2,000–6,000 ft. Indian wormwood grows to the height of 12 ft. It is considered in India a powerful deobstruent and antispasmodic. TREE WORMWOOD (*A. arborescens*), a native of the s. of Europe and the Levant, is also larger and more shrubby than the common wormwood, which in characters and qualities it much resembles.—The dried flower-buds of a number of species of A. are sold under the names of WORMSEED and of *Semen Contra*, *Semen Cinæ*, *Semencine*, etc., and have long been in much repute as an anthelmintic. *A. Santonica*, and *A. Sieberi* (or *A. Contra*), a native of Palestine, are believed to yield much of the wormseed which is brought from the Levant, also *A. Judaica*, a native of the East and of Barbary, which is regarded as the principal source of the Barbary wormseed. The flower-bush of *A. glomerata*, *A. Lerchiana*, and *A. pauciflora*, natives of the banks of the Volga, are also said to form part of the wormseed of the shops;

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and those of *A. Vahliana* are collected in the n.e. of Persia, and form the *Semen Cinæ Levanticum* or *Semen Cinæ in grains*. The flower-buds of *A. cœrulescens*, a Mediterranean plant, said to have been found on the sea-coast of England. form the anthelmintic called *Semen Seriphii* or *Barbotine*. Those of *A. camphorata*, another native of the s. of Europe, are used in the same way. Even those of *A. Absinthium* and *A. vulgaris* are used under the name of wormseed.—The plants from which the bitter aromatic liquor called *Extrait, Eau*, or *Crême d'absinthe* is prepared, are small low-growing species of A. (*A. mutellina*, *A. glacialis*, *A. rupestris*, *A. spicata*, etc.), found on the Alps and known to the inhabitants of the Alps by the name of *Genipi*. This liquor was first introduced as a febrifuge during the French campaign in Algeria in 1844, and was mixed by the French soldiers with their wine. They acquired a habit of drinking it diluted with water as a beverage; and its use rapidly extended, with very evil consequences. See ABSINTHE.—MUGWORT (*A. vulgaris*), which, a native of Europe, becoming American, like *A. Absinthium*, and often found in waste places, grows to the height of 3–4 ft., with pinnatifid leaves and somewhat racemed small flowers, which have each five florets of the ray. It emits, when rubbed, an agreeable smell, and has a bitter taste. In Germany, the young shoots and leaves are used in cookery for seasoning. It is used also for the same medicinal purposes as wormwood, but is weaker. Its leaves, and those of some of the other species, are used as fomentations for cleansing and healing wounds.—SOUTHERNWOOD (*A. abrotanum*) is a shrubby plant with long straight stems, 3–4 ft. high, the lower leaves bipinnate, upper leaves pinnate, their segments hair-like. It is a native of the s. of Europe and middle parts of Asia, and has long been a favorite plant in cottage gardens in Britain. It has an aromatic and pleasant odor. The leaves are used to drive away moths from linen; and in some parts of the continent of Europe, as an ingredient in the manufacture of beer. The smell of this plant appears to be peculiarly disagreeable to bees, which retreat from it; and a little branch of southernwood is sometimes efficaciously used when they are swarming, to promote their ascent into the new hive placed over them.—TARRAGON (*A. Dracunculus*) is a perennial plant, native of Siberia, long cultivated in gardens in Britain. It has a branching stem 1–1½ ft. high, with narrow leaves. It is fragrant, and has an aromatic smell and taste. The leaves and tender tips are a favorite ingredient in pickles. An infusion of the plant in vinegar is used as a fish-sauce. —The leaves of *A. Maderaspatana* are regarded in India as a valuable stomachic, and are also used in anodyne fomentations.—MOXA (q.v.) is prepared by the Chinese from the leaves of *A. Moxa* and other species, the whole surface of whose leaves is covered with a thick down.—*A. acetica*, a Persian species, is said to have a strong odor of vinegar. Many species of *A.* belong to N. Amer., and characterize especially the dry, barren plains of the west.

ARTEMUS WARD: see BROWNE, CHARLES FARRAR.

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AR'TERIES, DISEASES OF: morbid conditions of the arteries occasioned mostly by the deposition of *atheroma* (a Greek word signifying a tumor or deposit containing matter like *athērē*, meal or groats) in the deeper layers of the inner coat of the vessel; a new interlining to the artery being thus furnished. Atheroma (q.v.) has the effect of weakening, enlarging, and occluding arteries, according to the extent and period of the deposition. In the earliest stage, atheroma consists of a thin, soft, and clear membrane, lining a part or the whole of the tube. It seems a mere addition to the artery, in whose original coats there is no appearance of disease. It is probably a deposit on the inner surface from the blood. On the inner surface of the new coat, a similar layer gradually forms, and in the course of time becomes the foundation of subsequent formations; and when many strata have thus been deposited, the collective mass ceases to be transparent, and becomes converted into an opaque material similar to hardened albumen, and finally to ligament. Until this consolidation occurs, the coats of the artery are not much affected; but, by their adhesion to the hardened deposit, they lose their strength, elasticity, and natural color, and their functions are destroyed. The indurated deposit may now undergo one or other of these changes: it may either soften in its interior, in which case it degenerates into a pulpy mass of cholesterine, oil-globules, albuminous and chalky molecules; or it may be converted into a layer of hard, chalky, bone-like matter. This latter change (cretefaction or ossification) takes place only in the external oldest layers of thick deposits; and nothing intervenes between the bony plate and the middle coat of the artery, for the inner or lining coat partakes in the morbid change. It is obvious that either of these changes (softening or hardening) must gradually lead to disease of the arterial coats generally. The process of change is slow, and the change itself can be detected in the living subject only at an advanced stage. In the radial artery and others which lie superficially, the finger can often detect rings or tubes of chalky matter. Most commonly, however, the state of the arteries is detected by some secondary symptom.

Atheromatous deposit is attended at first with a narrowing of the calibre of the vessel, varying with the thickness of the deposit and most marked at the points of bifurcation. Smaller arteries may be completely obliterated, while the larger arteries may be very much contracted. Thus, the common iliac has been found to have its canal diminished by about one-half, and the great ascending branches of the arch of the aorta, the subclavian and carotid arteries, have been found very nearly closed. A later consequence of the same disease is dilation of the vessel. The power of the outer coats being insufficient to compress the deposit and to close in upon the blood, by which each contraction of the left ventricle of the heart distends them, they remain wide and distended during the relaxation of the ventricle, and the artery thus slowly expands; the enlargement being most marked at parts where

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there is most obstruction to the blood-current, as, for example, in curved arteries. These dilations are apt to terminate in regular aneurism—a tumor containing blood, and communicating with the cavity of an artery. See ANEURISM. The changes already described have an effect on the retractile power of the arteries. A healthy artery, if cut across, may shorten to the extent of an inch and a half, as has been actually measured by Mr. Moore ('Diseases of the Arteries,' in Holmes's *System of Surgery*, vol. iii. p. 329); but the retractile power is destroyed by the deposition of bony rings or plates. But although incapable of shortening, the arteries sometimes become abnormally lengthened, and consequently become not only dilated, but also tortuous. If the outline of superficial arteries thus affected be watched, each pulsation of the heart is seen to increase their curvature; and deep-seated arteries (as the iliac) are thus often forced from their normal positions. Another condition involving much danger is this: an ossified artery loses the smoothness which the interior of the vessel ought to present, and from the displacement or cracking of a bony plate there may be sharp, rough projections exposed, to which the fibrine of the circulating blood may adhere. These little clots, becoming detached, may be carried with the blood till they become arrested, and plug up an artery, thus presenting cases of embolism or thrombosis (q.v.). Again, the relation of this disease to accidents and surgical operations on arteries is obvious. A blow may crush a diseased artery, when a healthy, elastic vessel might have escaped injury. Such a slight movement as suddenly lifting the arm to the head, for the purpose of securing the hat in a sharp gale, has been known to have been followed by aneurism of the axillary artery. A ligature applied to any ossified artery is very apt to cause it to break, and the difficulty of securing such vessels is often very great. It is to this form of disease that most of the failures of operations for aneurism are due.

An important cause of occlusion of arteries is the closing of the canal by intrusion of a foreign body, especially by fibrinous plugs originally formed in the heart, and transported to other parts in the stream of the blood. When a large artery, for example the principal artery of one of the limbs, is 'suddenly plugged in its higher part, a sensation of severe pain is commonly the immediate result of the accident. In some cases the pain extends along the course of the vessel, which, though pulseless, is extremely tender; in others, the suffering is referred to some distant part of the limb, as, for instance, to the calf. Signs of a deficient circulation succeed, and they may amount to pallor, loss of temperature, numbness of the surface, or even to that "torpor" which is observed to precede the total death of a limb in certain cases of injuries of vessels. Such torpor implies not only a loss of circulating blood, but also a cessation of all feeling and motor power in the limb.'—Moore, *op. cit.*, p. 335. Although gangrene (q.v.) is always to be feared as the result of an

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obstructed artery of large size, it does not invariably follow; as a collateral circulation may be established, and the life of the limb may be thus saved. Very young persons will endure the obliteration of very large vessels without gangrene; and a case is on record (*Med. Chir. Trans.*, vol. xxix. p. 214) in which 'all the main arteries of both upper extremities and of the left side of the neck were reduced to solid cords,' and yet no gangrene ensued. From the description of the symptoms, the nature of a case of sudden occlusion of a large artery by a plug may possibly be recognized, or, at all events, suspected even by a non-professional observer. Medical aid must at once be sought. The early indications of treatment are to preserve the temperature of the part, to favor the establishment of a collateral circulation, to protect the limb from irritation or injury, to give nourishing blood-making food, and to relieve pain by the judicious use of opiates. The later treatment, if the affection is not checked, is described in the article GANGRENE.—*Arteritis*, or *Inflammation of the Arteries*, was a disease which was formerly recognized by physicians. No such specific general disease is now recognized, but the changes which have been already described as occurring in consolidated atheromatous deposits —either softening or ossification—are accompanied by an unnaturally vascular condition of the attenuated arterial walls, extending to true local inflammation, and even to suppuration.

ARTERIOT'OMY: the opening of an artery: an operation that has been strongly advocated in those cases in which it is desirable to produce upon the cerebral circulation more decided and immediate effect (as in severe forms of sanguineous apoplexy) than could be produced by ordinary venesection. It is supposed by some surgeons to relieve pressure on the brain more efficiently than opening the jugular vein could do; and whether this is the case or not, it is simpler and less dangerous. The only vessel operated on is either the temporal artery itself or one of its main branches. The operation is a simple one, but should, of course, be undertaken only by a surgeon. To arrest the flow of blood when sufficient has been taken, the artery should be completely divided, and after the parts have been sponged, a compress, or small pad, should be applied to the wound, and secured by a bandage, which must be carefully adjusted, so as, if possible, to remain undisturbed for four or five days, when it may be removed, and the wound covered with a strip of plaster.

ARTERY, n. *ăr'tĕr-ĭ* [L. and Gr. *artēriă*, a windpipe, an artery]: one of the vessels that convey the blood from the heart to all parts of the body. ARTERIAL, a. *ăr-tē'rĭ-ăl*, of or contained in arteries. ARTERIALIZE, v. *ăr-tē'rĭ-ăl-īz*, to render the blood coming from, or present in, the veins similar to that contained in the arteries; to oxygenate blood. ARTE'RIALI'ZING, imp. ARTE'RIALIZED, pp. *-īzd*. ARTERIALIZATION, n. *ăr-tē'rĭ-ăl-ī-zā'shŭn*, the process of making into arterial blood. ARTERIOTOMY, n. *ăr-tē'rĭ-ŏt'ŏ-mĭ* [Gr. *tomē*, a cutting]: opening an artery to let blood.

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Arteriology, n. *ăr-tē'rĭ-ŏl'ŏ-jĭ* [Gr. *artēriā*, an artery; *logos*, a discourse]: a discourse regarding the arteries; that part of medical science which treats of the arteries. **Arteritis**, *ăr-tē-rī'tĭs:* see **Arteries, Diseases of.**

ARTERY [named from the old idea that these tubes were air-carriers]: the vessels through which the blood passes from the left side of the heart to the tissues throughout the body. The structure of an arterial tube is very complex, and a section of it may be roughly subdivided into three layers, called the coats of the artery: an external, which is elastic and distensible; a middle, which is muscular, contractile, and brittle; an internal, also brittle, smooth, and transparent, being lined with epithelium on the side washed by the blood. The table is also enveloped in cellular tissue, termed the *sheath* of the A. When an A. is wounded by a sharp instrument, the effect varies with the direction of the cut. Thus, if longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse, the edges gape, and a nearly circular orifice allows of a profuse hemorrhage. If the A. be completely divided, its walls do not collapse like those of a vein, but pass through certain changes provided by nature to prevent fatal bleeding. The cut orifice contracts and each coat retracts from the coat external to itself, so that the internal coat is retracted farther than the middle, and the middle farther than the external coat. In addition to this retraction, the three coats curl inward, thus considerably narrowing the orifice, and presenting a surface on which a clot is more readily formed. This clot extends to the first large branch of the artery. The part of the artery thus plugged becomes in course of time a mere fibrous cord, and the portion of the body previously supplied by this artery is nourished by collateral circulation (see **Anastomosis**). When an A. is compressed by a ligature, the brittle inner and middle coats crack, curl inwards, and heal. See **Bleeding.**

Subdivisions of Arterial Wall.

1. Epithelial,	internal.
1. Fenestrated,	
3. Muscular,	middle.
4. Elastic.	
5. Fibrous.	
6. Areolar.	external.

The arteries of the human body are all offsets, more or less direct, of the aorta. As each main trunk passes into a portion of the body, it divides into two principal divisions: one, which breaks up into branches for the supply of the tissues in the vicinity—the A. of *supply;* and another, which passes almost branchless to supply the parts beyond —the A. of *transmission.* These, however, anastomose (q.v.) freely, so that the distant tissues are not solely

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dependent for their supply on only one arterial trunk. Thus, the femoral A. divides in the groin into the profunda, or *deep* femoral, to supply the thigh, and the *superficial* femoral, to supply the leg below the knee. Again, the common carotid divides into *external* carotid, to supply the neck and head, and the *internal* carotid, to supply the brain. Although arteries have generally the same distribution or arrangement of branches, they occasionally vary, and thereby are apt to puzzle a superficial anatomist. Mr. Thomas Nunn of London, an excellent human anatomist, has clearly shown that these anomalies in arterial distribution are all governed by the law of arterial distribution just mentioned, a fact which not only simplifies the study of arterial anatomy, but assists the operative surgeon out of perplexing positions. For the principal arteries, see their distinctive titles. The best authority on arteries is the splendid work of R. Quain. See ARTERIES, DISEASES OF.

ARTESIAN-WELLS, n. *ár-tē'zhăn:* borings or perforations made in the earth, in order to obtain a constant flow of water—so called from *Artois*, in France (the anc. *Artesium*), where first used. The possibility of obtaining water in this way in a particular district depends on its geological structure. All rocks contain more or less water. Arenaceous rocks receive water mechanically, and, according to their compactness and purity, part with a larger or smaller proportion of it. A cubic yard of pure sea-sand can contain, in addition to the quantity of dry sand which occupies that space, about one-third of its bulk of water. It would part with nearly the whole of this into a well sunk in it, and regularly pumped from. Chalk and other rocks, composed of fine particles, closely compacted together, contain as large a proportion of water; but from the power of capillary attraction, little or none of this water would be drained into a well sunk in such rock. From the existence, however, of numerous crevices in chalk through which the water freely flows, and from the general presence of a larger quantity of water than the porous rock is able to retain, wells sunk in chalk often yield water. There is yet a third class of rocks, which are perfectly impervious to water: such are clays, which are absolutely retentive, neither allowing water to be obtained from them nor to pass through them. When such rocks occur in basins (q.v.) in alternating layers, and in such order that pervious beds are inserted between impervious ones, it is evident that if a perforation is made through the retentive barrier-bed in the lower portion of the basin, the water contained in the water-logged strata will rise through the bore to a height depending upon the pressure of water which has accumulated in the confined sloping space between the two impervious beds.

The American system of driving wells, invented by Col. N. W. Green, was first applied 1861, and patented 1868. The plant includes an Andrews patent point for penetrating the earth, this point being coupled to a pipe, on which,

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after it has been driven down to water, an ordinary pump is screwed on and the air exhausted, when the water rises rapidly in the tube, whence it is readily lifted by the pump. See BORING. A large number of these wells are in use in the United States for furnishing water for irrigation, stock-raising, brewing, etc. Important wells are in St. Louis (begun 1849), Chicago, Louisville, New York, Columbus, O., Terre Haute, Ind., Charleston, S. C. (begun 1848), New Orleans, La., Titusville, Penn., Philadelphia, Penn., Andover, S. Dak., and Rondout, N. Y. The deepest of these wells is that driven for the St. Louis Insane Asylum, 1866–69, 3,843·5 ft. in depth, with a diam. two-thirds of the way of 4½ in. A well in Chicago of 1,200 feet discharges about 1,250,000 gals. with a head of 125 ft. above Lake Michigan. Gen. Pope, when in command of Texas, 1855, sunk a well in the Staked Plains 900 ft., and obtained good water.

Many such wells are in London and its vicinity; those which form the ornamental fountains in Trafalgar Square descend into the upper chalk to a depth of 393 ft. One of the most famous artesian wells is that of Grenelle, in the outskirts of Paris, where the water is brought from the gault at a depth of 1,798 ft. It yields 516½ gals. of water in a minute, projected 32 ft. above the surface; temperature, 81°·7 F. An artesian well in course of construction at Pesth yielded, at a depth of 3,100 ft., 175,000 gals. of water per day, of a temperature of 161° F., projected 35 ft. above the surface. It is to be sunk till the water reaches 178° F.

It is believed that the Chinese have been long acquainted with artesian wells. Such wells have been in use for centuries in Austria, especially in the neighborhood of Vienna, where they are abundant. No knowledge existed as to their source, and consequently the boring for them was engaged in and conducted in a rude and empirical manner. An excavation was made till a bed of clay was reached; on this a perforated mill-stone was laid, and through the hole the clay was bored until water rose. As soon as geology took the position of a science, and the theory of A. W. was propounded, the engineer was able, after the geological survey of a district, to discover whether a supply of water could there be obtained in this way. Already, districts formerly dry and arid have received a plentiful supply of water by means of such wells, and many more applications have yet to be made. (Tchihatchef, at the British Association in 1882, affirmed that A. W. were made in old Greek times in the Sahara, at Baalbek, etc.; and that crabs are found at the bottom of recent ones). Artesian borings have been executed in the Sahara of the province of Constantine with remarkable success. The first attempt, after a few weeks' labor, produced a constant stream, forming a river and yielding 4,010 quarts of water per minute, at a temperature of 78° F. In 1880, there were above 150 such borings in the province. The result is proving beneficial not only to the country materially, but also to the character and habits

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of its nomadic Arab inhabitants. Several tribes have already settled down around these wells, and forming thus the centres of settlements, have constructed villages, planted date palms, and renounced their previous wandering existence.

A. W. have supplied a portion of the data upon which the internal temperature of the earth has been calculated. They have their origin below that zone which is affected by the changing superficial temperature of the seasons, and consequently the water is of a constant temperature. Thus the Grenelle artesian well has a temperature of 81°·7 F., while the mean temperature of the air in the cellar of the Paris Observatory is only 53°. MM. Arago and Walferdin observed the temperature as the work proceeded, and found that there was a gradual and regular increase downwards. The latter gentleman made a series of very accurate and careful observations on the temperature of two borings at Creuzot, within a mile of each other, commencing at a height of 1,030 ft. above the sea, and going down to a depth, the one of 2,678 ft., the other about 1,900 ft. The results, after every possible caution had been taken to insure correctness, gave a rise of 1° F. for every 55 ft. down to a depth of 1,800 ft., beyond which the rise was more rapid, being 1° for every 44 ft. of descent. There are many very deep borings in the United States.

ARTEVELDE, *ăr'tŭ-vĕl-dĕh*, JACOB: d. 1345, Aug. 19: a brewer of Ghent, celebrated as a popular leader in the 14th c. In the war between England and France, he gave his aid to the former, while the counts of Flanders supported the latter. A., after gaining great advantages over the party of the nobles, went too far when he proposed that the son of Edward III. of England should be elected Count of Flanders. For this the Flemings were not prepared, and, in consequence, A. was killed in a popular insurrection. His son Philip, in 1381, was leader of the people of Ghent in their civil war against Bruges, and gained a victory over Count Louis. The latter was afterwards assisted by Charles VI. of France, and Philip was defeated and slain at Rosbeke, 1382.

ART EXHIBITIONS: public displays of the works of living artists, with the view, on the one hand, of affording gratification and instruction to the community, and, on the other, of procuring purchasers for the works exhibited. They have taken place in most of the principal towns of Europe, for more than a century and a half Though sometimes connected with Art Unions (q.v.), A. E. are much older institutions, though as the offspring of a necessity which did not exist in earlier times they are essentially modern. So long as artists were patronized chiefly by the church, by their respective governments, or by individuals of sovereign rank, their works were placed either in churches, in public buildings, or in palaces, and were thus continually exhibited to the public; but when private patronage came to be their chief support, and their works, if sold at all, were certain to be buried in private houses, the necessity for making arrangements by which they

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could be displayed to the public either before they were disposed of, or afterwards with the consent of their owners, became apparent. Until aided by Art Unions, A. E. for the most part had no success. The earliest collective art exhibition was probably that of the members of the Acad. of Fine Arts at Rome; anything of the kind which had previously existed being confined to the works of a particular artist and his pupils, enriched perhaps by a few contributions from his friends. Something of this earlier character probably attached to these Roman exhibitions; and the first art exhibition, in the sense in which we now understand it, seems to have been that of the French Academy, 1673. From 1745 to the period of the Revolution, this exhibition, which from its commencement had been confined to the works of members of the Academy, took place biennially. During the Revolution it was thrown open to foreign artists, and in 1796 it was again made annual. An exhibition was attempted in England, 1760, but it was not till 1769 that the regular exhibitions of the Royal Acad. commenced. The works exhibited in 1760 were only 130, the number of exhibitors being 69; in that of 1880 there were exhibited 1,650 works by about 850 artists. The annual revenue which the Acad. derives from the fee of one shilling by each visitor has also been steadily increasing. The exhibition of the Scottish Acad., next in importance, dates from 1826. To the first exhibition, 178 works were sent by 27 contributors; the exhibition of 1880 consisted of 1, 120 works, contributed by 502 artists. The annual revenue of the Scottish Acad. from this source exceeds £2,500. The only other exhibition of the same class in the United Kingdom is that of Dublin, supported by an annual grant from government—the exhibitions of London and Edinburgh being merely furnished with rooms erected at government expense. Several private societies in London and the provinces, however, have similar exhibitions: among these are the British Institution, the Soc. of British Artists, the National Institution, the Soc. of Painters in Water-colors, and its rival, the New Soc. of Painters in Water-colors. There are also exhibitions in several of the large provincial towns, such as Manchester, Liverpool, Glasgow, etc. On the continent of Europe, wherever an acad. of art exists, there is now an exhibition, which takes place for the most part annually, sometimes biennially. In all the large cities, and in many smaller cities of the United States, and in the chief universities and colleges, there are permanent art collections, besides important annual exhibitions under the charge of private societies in increasing numbers.

The London Exhibition of 1851, commonly known as the *Great Exhibition*, was not only on a larger scale, but introduced new features into these displays. Though confined to industrial objects and works of plastic art, it gave an impulse to A. E. strictly so called, which showed itself almost simultaneously in the great international artistic exhibition of Brussels; and even those exhibitions which have been formed more closely on its model—those of

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Dublin and New York, 1853, London, 1862, Paris, 1867, Vienna, 1873, Philadelphia, 1876, and Paris, 1878—all have included the fine arts.

ART'FUL, AR'TIFICE, etc.: see under ART.

ARTHANITIN, *ăr-thăn'ĭt-ĭn* [from *Arthanita officinalis*, a plant now called *Cyclamen Europæum*]: in *chem.*, a crystalline substance which may be extracted from the roots of the *Cyclamen Europæum*, *Primula veris*, *Anagallis arvensis*, and *Limosella aquatica*; called also *Cyclamin*. It is purgative, besides producing vomiting.

ARTHRITIC, a. *ăr-thrĭt'ĭk*, or ARTHRITICAL, a. *ăr-thrĭt'-ĭ-kăl* [Gr. *arthron*, a joint]: pertaining to the joints or to the gout. ARTHRITIS, n. *ăr-thrī'tĭs*, inflammation of the joints; the gout. See JOINTS: RHEUMATISM: GOUT. ARTHRODYNIA, n. *ăr-thrŏ-dĭn'ĭ-ă*, pain in the joints; chronic rheumatism. ARTHRODYNIC, a. *-ĭk*, pertaining to. ARTHROLOGY [Gr. *arthron*, joint; *logos*, discourse]: a discourse concerning the joints; that part of anatomical science which treats of the joints. ARTHROSIS, n. *ăr-thrō'sĭs*, articulation.

ARTHRODIA, n. *ăr-thrō'dĭ-ă* [Gr. *ar'thrŏō*, I fasten by joints]: a joint in which the head of one bone is received into the socket of another; a ball-and-socket joint. ARTHRODIAL, a. pertaining to.

ARTHROGASTRA: see ARACHNIDA.

ARTHROLOBIUM, *ăr-thrŏ-lō'bĭ-ŭm* [Gr. *arthron*, a joint; *lobos*, a legume]: joint-vetch; a genus of plants belonging to the leguminous order.

ARTHRONOMALUS, *ăr-thrŏ-nŏm'ăl-ŭs* [Gr. *arthron*, a joint; *anōmalos*, uneven, irregular]: a genus of centipedes. *A. longicornis*, a British species, is phosphorescent.

ARTHROPODA, n. plu. *ăr-thrŏp'ŏ-dă* [Gr. *arthron*, a joint; *podes*, feet]: those articulate animals such as crustaceans, spiders, and insects, which are provided with jointed limbs. This term is now used instead of Cuvier's *articulata* (q.v.).

ARTHUR, King of a tribe of ancient Britons: supposed to have lived 6th c. He is usually represented as a Christian prince, struggling bravely to maintain the liberty and faith of his country against the pagan Saxons, but there is no evidence for the statement that he fought against the Saxon Cerdic. Neither the Welsh bards nor Nennius assert this; in fact, it is merely an inference drawn from the supposition that the scene of A.'s exploits was the w. and s.w. of England. But Mr. Skene (*The Four Ancient Books of Wales*, vol. i., pp. 50–60) seeks to prove from an examination of Nennius (*Historia Britonum*, cap. 50), that the localities of the twelve great battles which A. fought are in Strathclyde, and therefore that he belongs to the region now called Scotland rather than to England. If there is any reality in A.'s history at all, this is probably the correct view of it, but the influence of Geoffrey of Monmouth's fictions, and of the French romances, succeeded in fixing the Cumbrian prince in the more important part of the

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island. It is a curious fact that no mention whatever is made of A. by the venerable Bede, the oldest of our historians, or by the annalists of the *Saxon Chronicle;* and Mr. Skene's explanation, that these authorities only 'record the struggle between the Britons and the Saxons south of the Humber,' is hardly satisfactory.

In the lays of the Welsh bards, supposed to be as early as the 6th and 7th centuries (although no manuscript is extant of older date than the 12th c.), A. and his brave companions are celebrated, but modestly and without miracle. It is in Nennius that the legendary additions begin to develop themselves, though Mr. Skene does 'not hesitate to receive the Arthur of Nennius as the historic Arthur.' Then follow at a distance of three or four centuries the so-called Armoric collections of Walter, arch-deacon of Oxford, from whom Geoffrey of Monmouth (q.v.) professes to translate, and in which the marvellous and supernatural elements largely prevail. Here for the first time the magician Merlin comes into association with A. According to Geoffry, A.'s father, Uther, conceiving a passion for Igerna, wife of Gorlois, Duke of Cornwall, is changed by Merlin into the likeness of Gorlois, and A. was the result. After his father's death, A. becomes paramount leader of the British, and makes victorious expeditions to Scotland, Ireland, Denmark, Norway, and even to France, where he defeats a great Roman army. During his absence, his nephew, Modred, revolts, and seduces Prince A.'s wife, Guanhumara. A., returning, falls in a battle with his nephew; and is carried to the Isle of Avallon to be cured of his wounds. Geoffrey's work apparently gave birth to a multitude of fictions which came to be considered as quasi-historical traditions. From these, exaggerated by each succeeding age, and recast by each narrator, sprung the famous metrical romances of the 12th and 13th centuries, first in French, afterwards in English, from which modern notions of A. are derived. In these his habitual residence is at Caerleon, on the Usk, in Wales, where, with his beautiful wife Guinevere, he lives in splendid state, surrounded by hundreds of knights and beautiful ladies, who serve as patterns of valor, breeding, and grace to all the world. Twelve knights, the bravest of the throng, form the centre of this retinue, and sit with the king at a round table, the 'Knights of the Round Table.' From the court of King A., knights go forth to all countries in search of adventures—to protect women, chastise oppressors, liberate the enchanted, enchain giants and malicious dwarfs, is their knightly mission. A Welsh collection of stories called the *Mabinogion*, of the 14th and 15th centuries, translated into English by Lady Charlotte Guest, 1849, gives an idea of the Arthurian legends. Some of the stories 'have the character of chivalric romances,' and are therefore probably of French origin; while others 'bear the impress of a far higher antiquity, both as regards the manners they depict, and the style of language in which they are composed.' These latter rarely mention A., but the former belong, as Mr. Skene puts it, to the 'full-blown

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Arthurian romance.' Early in the 12th c., the Arthurian metrical romance became known in Germany, and there assumed a more animated and artistic form in the *Parzival* of Wolfram of Eschenbach, *Tristan and Isolt* of Gottfried of Strasburg, *Erec* and *Iwein* of Hartmann, and *Wigalois* of Wirnt. The most renowned of the heroes of the Arthurian school are Peredur (Parzival or Perceval), Tristan or Tristram, Iwein, Erec, Gawein, Wigalois, Wigamur, Gauriel, and Lancelot. From France, the Arthurian romance spread also to Spain, Provence, Italy, and the Netherlands, and was again retransplanted into England. One of the publications that issued from the press of Caxton (1485), was a collection of stories by Sir Thomas Malory, either compiled by him in English, from various of the later French prose romances, or translated directly from an already existing French compendium. Copland reprinted the work in 1557, and in 1634 the last of the black-letter editions appeared. A reprint of Caxton's *Kynge Arthur*, with an introduction and notes by Robert Southey, was issued in 1817 (*The Byrth. Lyfe, and Actes of Kyng Arthur*, etc., 2 vols. 4to). The best edition is that by Thomas Wright (Lond. 3 vols., 1866) from the text of 1634. The name of King A. was given during the middle ages to many places and monuments supposed to have been in some way associated with his exploits, such as 'Arthur's Seat' near Edinburgh, 'Arthur's Oven' on the Carron near Falkirk, etc. What was called the sepulchre of his queen was shown at Meigle, in Strathmore, in the 16th c. The interest of the legends about King A. and his knights has been revived by Tennyson's *Idylls of the King* (1859 *et seq.*), and some of Wagner's operas. See Turner's *History of the Anglo-Saxons;* Ritson's *King Arthur;* Villemarqué, *Contes Populaires des Anciens Bretons* (1842); Grässe, *Sagenkreise des Mittelalters* (1842); Skene's *Four Ancient Books of Wales* (1868); Glennie's *Arthurian Localities* (1869); Cox's *Popular Romances of the Middle Ages* (1871); Fontan, *Arthur, ou le Roi-chasseur* (1874).

ARTHUR, Prince of Brittany: see King JOHN.

ARTHUR, CHESTER ALAN: twenty-first president of the United States; 1830, Oct. 5.—1886, Nov. 18, b. in Franklin co., Vt.; son of a Baptist minister, of Scotch-Irish extraction. He distinguished himself as a student at Union College, New York; studied law, and was admitted to the bar at an early age. At the outbreak of the great civil war, 1861, he held the post of inspector-general; and during the war was quartermaster-general for the New York forces. He subsequently returned to law practice, and became the head of an eminent law firm. A. was prominent in politics, on the republican side; and in 1871 Pres. Grant appointed him collector of customs at the port of New York. Not being an advocate of the administrative system known as Civil Service Reform, which Pres. Hayes favored, the pres. removed him from this post, 1878, and he returned to the practice of law. He was a leader of the republican party in the state of New York; and

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though belonging to the section of the republicans opposed to that represented by Gen. Garfield, was elected vice-pres. of the United States when Garfield was elected to the presidency, 1881. The death of Garfield, resulting from an assassin's pistol-shot, called the vice pres. to the supreme magistracy; and, 1881, Sept. 22, A. was inaugurated president, in which office he served till the end of the term, 1885, March 4. Returning to New York, his already failing health restrained him from public activity, and his death occurred in the following year. As a political leader A. had great energy and success, though his later leadership became unfortunately identified with a faction in his party; as president, he rose to the new demands and the peculiarly difficult duties of the exalted office to which an assassination had introduced him; winning in large degree the approval of former opposers by the dignity and fidelity of his administration.

ARTHUR'S SEAT: a hill in the immediate vicinity of Edinburgh, 822 ft. above the level of the sea. The ascent is easy, and the prospect from the top unrivalled. A. S. is supposed to derive its name from Arthur, the British king. When the hill received this appellation is not known; but at the close of the 15th c. the poet Kennedy mentions 'Arthur Sate or ony hicher hill.'

The hill is formed of a mass of trap of various species, upheaved through the carboniferous strata of Central Scotland, and presenting on the w. and s. sides, at the height of 570 ft., a perpendicular range of precipices, called Salisbury Crags, 60 to 80 ft. high. The trap is in tabular masses, and has elevated and hardened the carboniferous sandstone, shale, and limestone beds, which dip e., and crop out on the w., besides being broken through and overflowed by the trap-rocks. In the centre of the hill, the trap often encloses fragments of sandstone, and divides it by veins. The central and upper part of the hill, and the remarkable columns called 'Samson's Ribs,' are of basalt.

ARTIAD, n. *âr'tĭ-ăd* [Gr. *artios*, complete, even, opposed to odd]: in *chem.*, name given to elements of even equivalency, as dyads, tetrads, etc.; those of uneven equivalency, as monads, triads, etc., are called perissads [Gr. *perissos*, uneven].

ARTICHOKE, n. *âr'tĭ-chōk* [F. *artichaut*—from It. *articiocco*]: a thistle-like perennial plant, now growing wild in the s. of Europe, but probably a native of Asia; the *Cyn'ăra scol'ymus*. The genus *Cynara* belongs to the natural order *Compositæ*, sub-order *Cynarocephalæ*, and is distinguished by the bracts of the involucre being fleshy at the base, and emarginate, with a hard point and the receptacle fringed. *C. scolymus* has the radical leaves 3–4 ft. long, somewhat spiny, some of them pinnatifid, some undivided. The stem is two or three ft. high, branched, with large heads of violet-colored (sometimes white) thistle-like flowers at the summits of the branches. The involucre is tumid, and consists of fleshy, roundish-ovate, crenate, acuminate,

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imbricated scales. The seeds are elongated and quadrangular, with smooth and firmly attached pappus. The plant has been long cultivated for the sake of the delicate succulent *receptacles* of the heads of flowers, taken before the flowers expand, which are boiled and eaten, or, on the continent of Europe, eaten raw with salt and pepper. The part used is the same which in thistles is called by children the *cheese*, and is sometimes eaten by them. The tender central leaf-stalk is also occasionally used in the same way as that of the Cardoon. Several varieties are in cultivation, differing in the more or less spiny leaves, and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about four ft. asunder, and two ft. apart in the row. The A. bed continues productive for several years. Seaweed is an excellent manure for it.—The CARDOON (q.v.) belongs to the same genus.—The JERUSALEM A. (q.v.) is a totally different plant.

ARTICLE, n. *âr'tĭ-kl* [F. *article*—from L. *artic'ulus*, a little joint—from *artus*, a joint: It. *artĭcolo*]: a jointed thing or part; a clause or item; a particular thing; a contribution in a periodical; in *gram.*, a word put before a noun to point it out and limit its application: V. to bind by conditions; to stipulate. ARTICLED, pp. *âr'tĭ-kld:* ADJ. bound by conditions. ARTICULATE, v. *âr-tĭk'ū-lāt* [L. *artĭculātus*, furnished with joints]: to unite by means of joints; to pronounce words distinctly; in *OE.*, to make terms; to treat: ADJ. distinct; jointed. ARTIC'ULATELY, ad. *-lĭ.* ARTIC'ULATENESS, n. the quality of being articulate. ARTICULATION, n. *âr-tĭk'ū-lā'shŭn*, the uniting together by means of joints, as in the bones of a skeleton; distinct pronunciation; an arrangement of joints. ARTIC'ULATING, imp. ARTIC'ULATED, pp.: ADJ. possessing joints. ARTICULATOR, *âr-tĭk'ū-lā'tĕr*, one who articulates. ARTICULAR, a. *âr-tĭk'ū-lĕr*, of or belonging to the joints. ARTIC'ULARLY, ad. *-lĭ.* ARTICULATA, n. plu. *âr-tĭk'ū-lā'tă*, one of the great divisions of the animal kingdom, designating those creatures which are encircled by jointed rings, as worms, lobsters, etc., now frequently known by the name ARTHROPODA. ARTICLES OF ROUP, in *Scot.*, the written or printed conditions binding on purchasers at a public sale by auction. ARTICLES OF WAR, the military code of laws for the government of soldiers. LORDS OF ARTICLES, in *Scot. hist.*, the committee of Scottish parliament who prepared all articles and bills in proper form to be placed before parliament. THIRTY-NINE ARTICLES, the summary of doctrines containing the authorized teaching of the Church of England.

AR'TICLE: in general a part of a systematic whole. Thus, we speak of the several articles of a confession; the articles of war; a leading article, etc.

The use of A. as a grammatical term arose as follows: In such a sentence as, 'He found *that* (or *the*) man *that* he was looking for,' the Greeks considered the defining particles as connecting the two parts of the sentence, and

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called them joints (Gr. *arthra*, Lat. *articuli*); the name was subsequently confined to the first of the two, the other being called the relative.

In English, there are two articles—the definite *the*, and the indefinite *a* or *an;* and other modern languages have corresponding words. But articles are not essential to language. The Latin had no articles, and the Greek, as well as the older Germanic languages, the Mœso-Gothic and Old Norse, e.g., had only the definite A. 'In no language,' says Dr. Latham, 'in its oldest stage, is there ever a word giving, in its primary sense, the idea of *an* or of *the*. As tongues become modern, some word with a *similar* sense is used to express the relation. In the course of time, a change of form takes place, corresponding to the change of meaning.'

The definite articles originate uniformly in demonstrative pronouns. Eng. *the* is only a weakened form of *that* (Anglo-Sax. *thæt*). The same is the case with Ger. *der;* and French *le*, Ital. *il* and *lo*, and Sp. *el*, are all from the Lat. *ille*, 'that.' In like manner, *an* or *a* is from the old form of *one* (ane); Ger. *ein* is both *one* and *a;* and so are Fr. *un*, Ital. and Sp. *uno*, both from Lat. *unus* = *one*.

In the Scandinavian tongues, the article is attached to the end of the word; the Danish, e.g., writes *kong-en*, the king; *hus-et*, the house.

ARTICLES OF FAITH: summary of religious views, set forth by a church or a company of churches, and used in many cases as a denominational standard. See CREEDS AND CONFESSIONS.

ARTICLES OF WAR: regulations made for the government of the military and naval forces of the country; laws, or rules, governing the modes of trial and of punishment for breaches of discipline, and denominating the offenses to which these modes are appropriate.

United States Army.—The articles in force are comprised in an act of congress 1806, Apr. 10, and are 128 in number, of which 80 refer to punishments, the remainder relating to organization of courts-martial and courts of inquiry, and cognate subjects. The following is a summary. Officers can be tried only by general courts-martial, and, unless impossible, only by officers of their own or higher rank. Officers commanding army corps, regts., garrisons, or forts, are empowered to order courts for trial of enlisted soldiers for all offenses except such as are capital; and in time of war, a field officer can be detailed in each regt. to try such minor offenses. Such courts cannot punish by imprisonment for more than 1 month, nor by fine exceeding one month's pay. Officers under arrest are entitled to see a copy of charges brought against them, and to trial within a specified time. In time of peace any gen. officer in command of an army or a dept., and in time of war any division or brigade commander, is authorized to order a general court-martial; but in case such gen. officer or commander is the accuser, the court is appointed by the pres., and its findings must be sent to the sec. of war, and by him to the pres. for approval. Offenses in-

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clude unlawful enlistments, wasting or spoiling ammunition or accoutrements, disrespect toward a superior officer, challenge to a duel, fraud, embezzlement, etc. Punishments include fine, imprisonment, dismissal, and death. Since 1875, flogging as a punishment has been abandoned: and branding, marking, or tattooing are forbidden. The punishment of death can be inflicted only after confirmation by the pres., except in the case of spies, mutineers, and murderers, guerillas, and others who commit crimes in violation of the laws of warfare; and in the cases of sleeping on post, inciting to mutiny, cowardice in the presence of the enemy, etc.

United States Navy.—Sixty articles govern procedure in cases of insubordination or crime, and are applied by courts-martial. The offenses and punishments enumerated vary little from those above cited for the army. No officer is subject to dismissal or death, except when the sentence has been confirmed by the pres.; for all other cases the designated punishment can be inflicted by the officer who orders the court. Offenses committed on shore receive the same punishment as if committed at sea. The proceedings of a court-martial are subject to revision, and the sentence to remission or mitigation, by the officer ordering the court-martial. The punishment of death, where authorized, need not necessarily be inflicted by the court-martial, which is empowered to substitute therefor imprisonment for life.

ARTICLES, THE SIX: often mentioned in the ecclesiastical history of England in the 16th c.; imposed by act of parliament, 1539, when Henry VIII. was displeased with some of the bishops most favorable to the Reformation, and their opponents for a time regained the ascendency. These A. asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. The act imposing them was popularly called 'the six-stringed whip.' Severe penalties were appointed for writing or speaking against them, and for abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation.

ARTICLES, THE THIRTY-NINE, of the Church of England: articles of religion agreed upon by the archbishops and bishops of both provinces and the whole clergy in the convocation at London, 4th year of Elizabeth, 1562, under Abp. Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, forty-two in number, in the reign of Edward VI. The council appointed in the will of Henry VIII. to conduct the government during the king's minority, was for the most part favorably disposed towards the Reformed opinions, and the management of church affairs devolved almost entirely upon Abp. Cranmer. In the year 1549, an act of parliament was

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passed, empowering the king to appoint a commission of 32 persons, to make ecclesiastical laws. Under this act, a commission of 8 bishops, 8 other divines, 8 civilians, and 8 lawyers (among whom were Cranmer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, Justice Hales, etc.) was appointed, 1551, and one of its first acts was to draw up a code of articles of faith. These were forty-two in number, and were set forth by the king's authority in 1553. Strype and Burnet make it appear that these forty-two articles were agreed upon in the convocation that was sitting in 1552, but this was not the fact. Fuller, speaking in his quaint way of this convocation, declares that it had 'no commission from the king to meddle with church business, and,' he adds, 'every convocation in itself is born deaf and dumb, so that it can neither hear nor speak concerning complaints in religion till first *Ephphatha*, "Be thou opened," be pronounced unto it by royal authority. However,' he continues, 'this barren convocation is entitled the parent of those forty-two articles which are printed with this title, *Articuli de quibus in Synodo Londinensi* 1552 A.D. *inter Episcopos et alios convenerat.*' To these articles was prefixed the Catechism, and there is no doubt that Cranmer had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication, Edward died, and one of the first acts of the convocation summoned with the parliament in the first year of Queen Mary was to declare that these forty-two articles had not been set forth by the agreement of that house, and that they did not agree thereto. In 1558, Elizabeth succeeded her sister. In 1559, Parker was installed in the see of Canterbury, and immediately the other vacant sees were filled. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the Reformed Church. Parker applied himself to this work, and for the purpose revised the forty-two articles of King Edward, rejecting four of them entirely, and introducing four new ones, viz., the 5th, 12th, 29th, and 30th as they now stand, and altering more or less seventeen others. This draft Parker laid before the convocation which met in 1562, by which further alterations were made; and the 39th, 40th, and 42d of King Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to thirty-nine. They were drawn up and ratified in Latin, but when they were printed, both in Latin and English, the 29th was omitted, and so the number was further reduced to thirty-eight. From these thirty-eight there was a further omission, viz., of the first half of the 20th article, which declares that 'the church hath power to decree rites and ceremonies, and hath authority in controversies of faith.' As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how the omissions arose. However, in 1571, the

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articles once more underwent revision. Abp. Parker and Bp. Jewel made a few slight alterations, and the 29th being restored, the convocation which was then sitting ratified them both in Latin and English, and an act of parliament was passed in that year compelling the clergy to subscribe 'such of them as only concern the confession of the true Christian faith, and the doctrine of the Sacraments.' There still, however, remained some difficulty as to which was the authorized copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the thirty-nine articles as they now stand. 'His Majesty's Declaration,' which precedes them, and directs that they shall be interpreted 'in their literal and grammatical sense,' was prefixed by Charles I. in 1628.

It is interesting to know from what other sources the thirty-nine articles are derived. Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording, with the Confession of Augsburg. The 9th and 16th are clearly due to the same source. Some of them, as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII., and annotated by the king's own hand. The 11th article on justification, is ascribed to Cranmer, but the latter part of it only existed in the articles of 1552. The 17th, on predestination, may be traced to the writings of Luther and Melanchthon.

The thirty-nine articles have been described as 'containing a whole body of divinity.' This can hardly be maintained. They contain, however, what the Church of England holds to be a fair scriptural account of the leading doctrines of Christianity, together with a condemnation of what she considers to be the principal errors of the Church of Rome, and of certain Protestant sects. As far as they go (and there are many things unnoticed by them) they are a legal definition of the doctrines of the Church of England and Ireland; though it is to the *Book of Common Prayer* that members of that communion look for the genuine expression of her faith They were adopted by the convocation of the Irish Church in 1635, and by the Scotch Episcopal Church at the close of the 18th c. Corpus Christi College, Cambridge, contains the only copies of the A. in manuscript or print that are of any authority. Among them are the Latin manuscript of the A. of 1562, and the English manuscript of the A. of 1571, each with the signatures of the archbishops and bishops who subscribed them. See *An Account of the Thirty-nine Articles*, by Dr. Lamb.

For other 'Articles,' see LAMBETH: PERTH: SCHMALKALD.

ARTICULATA, *ăr-tĭk'ū-lā'tŭ* (or ARTICULATED ANIMALS): one of the great primary divisions of the animal kingdom, according to the system of Cuvier (see ZOOLOGY), and including those animals of which the body is distinctly segmented—the higher worms, as well as Insects, Crustaceans,

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Arachnids, and Myriapods. The four latter groups were separated from the Annelida (q.v., and see also the article WORMS) by Von Siebold, on account of their possession of hollow jointed limbs, into a separate sub-kingdom, Arthropoda. The term Arthropoda is now largely used instead of Articulata.

ARTHROPODA.—In this great division of the animal kingdom, the body consists of a usually definite number of segments, each bearing a pair of hollow and almost always jointed limbs, into which the body muscles proceed.

In all cases, the epidermis gives rise to an external horny layer of *Chitine* (q.v.), which usually attains considerable strength and thickness, and in Crustaceans is further strengthened by impregnation with salts of lime. The segments of the body and their corresponding appendages exhibit considerable differentiation, especially in the anterior region of the body, where also some or many segments may completely coalesce, their appendages also becoming extraordinarily modified for various functions; so that it requires the combined research of both the embryologist and the comparative anatomist, to analyze the organism into its constituent parts. The nervous system is a ventral chain of ganglia united by longitudinal and transverse commissures, and one pair of ganglia is developed for each segment, although some of these also coalesce more or less completely in the adult.

The A. divide naturally into two great alliances—the water-breathers, or *Branchiata* (see GILLS), and the air-breathers, or *Tracheata* (see RESPIRATION); the former including the *Crustacea*, and the latter the *Prototracheata* or *Peripatidea*, the *Myriapoda*, the *Arachnida*, and the *Insecta*. For the relation of the Arthropoda to other groups, see ZOOLOGY. Also, see CRUSTACEA: MYRIAPODA: ARACHNIDA: and INSECTS: the group *Peripatidea* having been most recently established as a distinct class. The *Peripatidea* are represented by a single genus, *Peripatus*, which appears, both from its extreme simplicity of structure and its wide distribution (S. Amer. and the Antilles, S. Africa, New Zealand) to be of very remote antiquity. At first supposed to belong to a mere subclass of Annelids, its arthropod character was not established till the voyage of the *Challenger*, when the discovery was made that it has distinct tracheæ, which open irregularly over the surface of the body, instead of being disposed in regular relation to the segments. Its segments and their appended limbs, its visceral anatomy, and its development are all distinctly arthropodan, and show that we have here almost the most primitive imaginable form of the Tracheate Arthropoda. *Peripatus* is about 1½ inches long, inhabits decayed wood, and has the curious and suggestive habit of spinning a web over itself when alarmed. (See Moseley, *Notes of a Naturalist in the Challenger*).

ARTICULATE SOUNDS: see LETTERS.

ARTICULATION: see JOINTS.

ARTICULITE, *âr-tik'ū-līt* [L. *articulus*, a little joint: Eng. suf. *-ite*]: a mineral, called also itacolumite, a variety of quartz (q.v.).

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ARTIFICIAL LIMBS: known only since the time of Ambrose Paré, whose *Œuvres de Chirurgie* were pub. 1575—with the exception that there is recorded the celebrated artificial hand of the German knight, Götz von Berlichingen*—who lived in the early part of the 16th c. (1513), and who was named *The Iron-handed*—which weighed three pounds, was so constructed as to grasp a sword or lance, and was invented by a mechanic of Nuremberg. The twelfth chapter of Ambrose Paré's volume, translated by Thomas Johnson, 1605, shows 'by

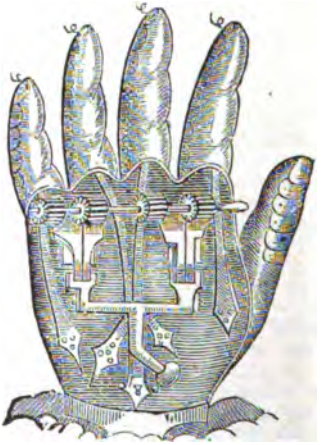

Fig. 1.

what means arms, legs, and hands may be made by art, and placed instead of the natural arms, legs, and hands that are cut off or lost.' The accompanying figures are copies of his drawings of 'an hand made artificially of iron' (Fig. 1), and of 'the form of an arm made of iron verie artificially' (Fig. 2). He also gives a drawing of 'a wooden leg made for a poor man' (Fig. 3), which is simply the common wooden leg with bucket receptacle still in use. No improvements worthy of record were made from the time of Ambrose Paré to the beginning of the present c., when Baillif of Berlin constructed a hand which did not exceed a pound in weight, and in which the fingers,

* The iron hand of this knight, who has been immortalized by Goethe, is preserved at Jaxthausen, near Heilbronn, and a duplicate of it is in the Schloss at Erbach, in the Odenwald. It is stated in Scott's *Border Antiquities*, vol. ii., p. 206, that the family of Clephane of Carslogie 'have been in possession from time immemorial of a hand made in the exact representation of that of a man, curiously formed of steel,' which was conferred by one of the kings of Scotland on a laird of Carslogie, who had lost his hand in the service of his country.—See *Notes and Queries* for 1867, July 17, p. 35.

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without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat, and even a pen. 'Artificial hands,' says Mr. Heather Bigg, 'are now constructed, by means of which a pin may be picked up from the ground, a glass raised to the lips, food carried to the mouth, and a sword drawn from the scabbard, and held with considerable firmness; while a com-

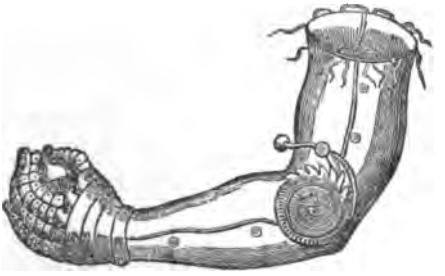

Fig. 2.

bined arm and hand is fabricated, which is equal to the ordinary requirements of histrionic declamation.'—*Orthopraxy*, 1865, p. 157. The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is best suited for an arm when it gradually tapers to its lowest end, and terminates in a rounded surface. When an arm is removed at the shoulder-joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow-joint, the best stump is one which includes about two-thirds of the fore-arm; while a stump formed by amputation at the wrist is very unsatisfactory. The simplest form of artificial arm intended to be attached to a stump terminating above the elbow, 'consists of a leathern sheath accurately fitted to the upper part of the stump. The lower end of the sheath is furnished with a wooden block and metal screw-plate, to which can be attached a fork for holding meat, a knife for cutting food, or a hook for carrying a weight.'—*Op. cit.* p. 160. The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated, and therefore more expensive, pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, and the wrist movements are partially imitated; and a degree of natural softness is given to the hand by a covering of gutta-percha and India rubber. Such a hand, says Mr. Bigg, is often more symmetrical in aspect than the natural hand, but it possesses no efficient grasping power. Hence

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provision has to be made for attaching various instruments to its palm, such as special hooks, which can be removed at pleasure, for driving, shooting, etc.; apparatus for using the knife and the fork, for grasping the pen, etc.; indeed, the number and variety of instruments capable of being applied to an artificial hand are very great. Nothing has tended so much to the very highest development of artificial arms and hands, as an accident which happened more than a quarter of a century ago to the celebrated French tenor, M. Roger, who lost his right arm above the elbow. It was necessary, for his future appearance on the stage, that he should have an artificial limb, which would serve the purposes of histrionic action, and permit him to grasp a sword and draw it from its scabbard. Such a contrivance was invented in 1845 by Van Petersen, a Prussian mechanician, and the French Academy of Sciences commissioned MM. Gambey, Rayer, Velpeau, and Magendie to report upon it. For a history of the nature of the limb, the reader is referred to the report, which appeared in the *Comptes Rendus* for that date, or to Mr. Bigg's *Orthopraxy*, pp. 176–181. The apparatus, which weighs less than 18 ounces, was tested upon a soldier who had lost both arms. By its aid he was enabled to pick up a pen, take hold of a leaf of paper, etc.; and the old man's joy during the experiment was so great, that the Academy presented him with a pair of these arms. Van Petersen's conceptions have been extended and improved by Messrs. Charriere, the celebrated surgical mechanics of Paris, aided by M. Huguier, the well-known surgeon. A very marvellous arm has also been almost simultaneously constructed by M. Bechard, which, 'by means of a single point of traction, placed in pronation, executes first the movement of supination, next in succession the extension of the fingers and abduction of the thumb: the hand is then wide open.'—Bigg, *op. cit.* p. 190.

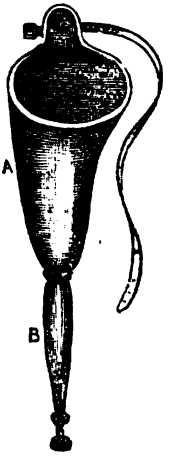

Fig. 3.

Artifical legs having fewer requirements to perform than artificial arms, are comparatively simple in structure. We borrow the description of our figure of the ordinary bucket leg in common use among the poorer classes from Mr. Bigg's *Orthopraxy*. 'It consists of a hollow sheath or bucket, A, accurately conformed to the shape of the stump, and having—in lieu of the more symmetric proportions of the artificial leg—a "pin," B, placed at its lower end to insure connection between it and the ground. This form of leg is strongly to be recommended when expense is to be avoided, as it really fulfils all the conditions excepting external similitude embraced by a better piece of mechanism. It is likewise occasionally employed with

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benefit by those patients who, from lack of confidence, prefer learning the use of an artificial leg by first practicing with the commonest substitute.' As, when the body rests on a single leg, the centre of gravity passes through the tuberosity of the ischium, it is essential that the bucket should be so made as to have its sole point of bearing against this part of the pelvis.

Of the more complicated forms of artificial leg three are especially popular. The first of these is of English origin, and owing to its having been adopted by the late Marquis of Anglesea, is known as the *Anglesea leg*. For a description of it, the reader is referred to Gray's work on *Artificial Limbs*, one of the firm of Grays having been the constructor of the legs used by the marquis. This was for a long time *the* fashionable artificial leg. The second leg worthy of notice is that invented by an American named Palmer, and called the *Palmer leg*. From its lightness and the greater ease of walking with it, it has long superseded the Anglesea leg in America. In the third of these legs, also invented in America, and known as *Dr. Bly's leg*, the principal faults of the two other legs have been completely overcome. The advantages of this leg are thus summed up by Mr. Bigg, who has fully described and figured its mechanism: (1) Adaptation to all amputations either above or below the knee. (2) Rotation and lateral action of the ankle-joint. (3) Power on the part of the patient to walk with ease on any surface, however irregular, as, owing to the motion of the ankle-joint, the sole of the foot readily accommodates itself to the unevenness of the ground, which is an advantage never before possessed by any artificial limb. (4) The ankle-joint is rendered perfectly indestructible by ordinary wear, owing to its centre being composed of a glass ball resting in a cup of vulcanite; thus it never gets out of repair, as the Anglesea leg frequently does, and the original cost is almost the only cost. (5) The action of the ankle-joint is created by five tendons, arranged in accordance with the position assigned to them in a natural leg. These tendons are capable of being rendered tight or loose in a few instants, so that the wearer of the leg has the power of adjusting with precision the exact degree of tension from which he finds the greatest comfort in walking, and also of giving the foot any position most pleasing to the eye. (6) There is a self-acting spring in the knee-joint, urging the leg forward in walking, and imparting automatic motion, thus avoiding the least trouble to the patient. (7) The whole is covered by a beautiful flesh-colored enamel, which can be washed with soap and water. (8) At the knee-joint there is a mechanical arrangement representing the crucial ligaments, and affording natural action to that articulation by which all shock to the stump in walking is avoided. Hermann's artificial limb is still more highly approved by many, as affording more support when the knee is bent. See Max Schede's work on Amputation, the *System of Surgery* by Holmes and Hulke (3d ed. 1883), or other surgical authority.

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In cases of arrested development of the lower limbs, short-legged persons may be made of the ordinary height by the use of two artificial feet placed twelve or more inches below the true feet, and attached to the legs by means of metallic rods, jointed at the knee and ankle.

Other parts, not entitled to be called limbs, can also be replaced by mechanical art—such as the nose, lips, ears, palate, cheek, and eye. In the present advanced state of plastic surgery, deficiencies of the nose, lips, and palate can usually be remedied by an operation; cases, however, may occur where an artificial organ is required. Artificial ears are moulded of silver, painted the natural color, and fixed in their place by a spring over the vertex of the head. Loss of an eye causes sad disfigurement; but the artificial eyes of Boissonneau (see his *Renseignements Généraux sur les Yeux Artificiels*) can hardly be detected.

ARTIGA, *ar-tē'gâ*, FRANCISCO DE: b. at Huesca abt. the middle of the 17th c., d. 1711: Spanish landscape-painter, engraver, and author. He taught at Huesca in a chair of mathematics endowed by himself, and wrote on mathematics and other subjects.

ARTIGAS, *ar-tē'gâs*, JUAN, or FERNANDO JOSÉ: abt. 1760–1826; b. Montevideo: S. American general and dictator. He began his career in Buenos Ayres in the insurrection against Spain, and afterwards joined the republican army besieging the Brazilians in Montevideo, but quarrelled with the director, and was outlawed. He then organized a band of *gauchos*, defeated the Buenos Ayres troops, and established himself as dictator in Montevideo. Later he met with a series of defeats, and died in exile.

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ARTILLERY, n. *ăr-tĭl'lĕr-ĭ* [F. *artillerie*, engines of war —from mid. L. *artillāria*, any kind of warlike weapons or machines; *artillātor*, a maker of machines—from *artem*, in mid. L. sense, 'art of war']: weapons of war of any kind; cannon; great guns, etc. ARTILLERYMAN, the man who assists to manage a cannon. ARTIL'LERIST, n. one skilled in gunnery.

ARTILLERY: sometimes meaning large cannon or ordnance of every kind; sometimes including the shot and shells; sometimes applying to the soldiers who manage the cannon. For large pieces of ordnance, as a class, see CANNON: for specialties see CARRONADE: HOWITZER: GUN: MORTAR: etc.: and in some cases the names of the inventors, as ARMSTRONG GUN: LANCASTER GUN: etc.. See also FIREARMS: RIFLED ARMS: GUNNERY: SHELLS: SHOT. The term *Equipment of A.* is applied to a combination of men, *matériel*, and horses, suitable for coast-defenses, sieges, or the arming of fortified posts. There are several kinds of equipments of *light* A., under the names of horse, field, rocket, mountain, and reserve; and others of *heavy* A., for the attack and defense of coasts and fortified places. These various equipments are generally divided into smaller collections called *Batteries* (q.v.), for more easy control and maneuvering. *Park of A.* is a collective name given to the whole of the guns, carriages, ammunition, and other appurtenances essential to the working of field or siege A.

Artillery Corps.—Before the invention of gunpowder, the larger projectile weapons, sometimes called *engines of war*, sometimes *artillery*, were worked by rough soldiers, who needed no particular apprenticeship to that art. When, however, large balls of iron came to be propelled by the tremendous force of gunpowder, a great revolution gradually took place, though garrison-guns and siege-guns were improved more rapidly than field-guns. Nevertheless, field-guns changed the whole aspect of military tactics; for it became necessary that an army should form in order of battle at a much greater distance from the enemy than in older times. And as cannon were made more rapidly movable, so did tactics vary. Gradually, a body of men was set apart to study the force and action of gunpowder, the flight and range of projectiles, the weight and strength of cannon, and the maneuvering of heavy masses. The French were the first to make these researches; after them, the English; and later, the Germans. During the Thirty Years' War, an important step was taken in Germany—that of including the artillerymen, who were till then a sort of guild, as a component in the regular army. Gustavus Adolphus in Sweden, Frederick II. in Prussia, and Napoleon I. in France, all attached a very high degree of importance to the A. as an arm of the service. After the great wars in the beginning of the present century, nearly all the states of Europe formally recognized the A as the third great branch of military service (next after the infantry and cavalry); indeed, in almost all present armies, it takes practically the first place.

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Field-A., or *Light A.*, is designed for service in the field, and comprises flying A., foot A., horse A., and mountain A. Flying A., as its name indicates, is intended to execute very rapid evolutions, the guns and the gunners, with the ammunition chests, etc., being moved from one position to another in the field by horses. Foot A. is served by artillerymen on foot, and accompanies bodies of infantry. Horse-A. consists of light guns or machine guns; the gunners are mounted while executing maneuvres. Mountain-A. comprises light guns of small calibre, which are mounted on light carriages or borne on the backs of pack animals. The field-A. of an army or military establishment is divided into *batteries*, each consisting of 4–8 guns, with a certain complement of wagons, men, and general outfit. For an army in the field, 3 pieces of A. to 1,000 infantry is the approved proportion. *Heavy A.* comprises sea-coast A. and siege-A. The guns of the sea-coast A. service are of the heaviest kind and are mounted in permanent works. Siege-A., consisting of heavy guns mounted on carriages for transportation, accompanies armies in their operations: it is employed to defend field works or to reduce the works of an enemy.

The A. service of the U. S. army comprises 5 separate regts. of 12 batteries each (2 of each 12 batteries being 'light'), with 282 officers and 3,675 men. The uniform has red facings and trimmings.—The A. service of France had (1890) 19 regts. mounted A. of 12 batteries each, every regt. having 77 officers, 1,274 men, 767 horses; 19 other regts., with 9 batteries mounted and 3 batteries of horse-A., the strength of these regts. being 77 officers, 1,280 men, 845 horses; 4 mounted batteries, each with 4 officers, 153 men, 132 horses; 20 batteries of mountain A., each consisting of 4 officers, 238 men, 167 horses; total 480 field batteries, 2,060 pieces. The fortress A. of France comprised 16 battalions of 6 batteries each, a battery being 4 officers, 152 men, 6 horses; and there are 4 batteries in Algeria—total 100 batteries.—The field-A. of the German empire comprised (1890) 38 regts. having 1,984 officers, 40,929 men, 22,457 horses, 1,538 guns. The foot A. had 14 regts. and 3 battalions, 738 officers, 17,244 men.

Artillery Schools.—The headquarters for A. instruction in England are at Woolwich. France has seven A. schools. In Prussia, the A. and engineer schools are combined.

The School of Artillery for the U. S. army is at Fortress Monroe. A col. of the artillery is in command, assisted by a lieut.col. and a major. The course of study occupies two years, and includes both theory and practice.

ARTIODACTYLA, n. plu. *ăr'tĭ-ō-dăk'tĭ-lă* [Gr. *ar'tĭŏs*, even; *dak'tulos*, a finger, a toe]: a division of the hoofed quadrupeds in which each foot has an even number of toes, as two or four. The great mammalian order Ungulata (see MAMMALIA: UNGULATA) is divided into two groups; first, the *Perissodactyla*, including the horse, tapir and rhinoceros, besides a multitude of extinct forms, and distinguished by the third digit of each limb being sym-

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metrical in itself, by the presence of an odd number of digits on the hind-foot, by the number of dorso-lumbar vertebræ being at least twenty-two, and so on; while the second sub-order, the *Artiodactyla*, have the third digit, unsymmetrical in itself, but forming a symmetrical pair with the fourth digit. While the hind-foot bears an even number of digits, the number of dorso-lumbar vertebræ never reaches twenty-two, and rarely exceeds nineteen. Numerous minor osteological differences exist between the two sub-orders, which broadly correspond to the ancient divisions of solid-hoofed and cloven-hoofed respectively. See FOOT.

The A. divide into two groups—the *Non-ruminantia* and the *Ruminantia*. The former have usually more than one pair of upper incisors, and the molars have a more or less tuberculated pattern, whence they are frequently termed *Bunodonta*. The metatarsal bones remain separate, and there are no horns. The stomach has rarely more than two divisions. The *Non-ruminantia* include two existing families, *Suidæ* and *Hippopotamidæ*. The *Suidæ* (pigs) have the skin moderately thick and hairy; the third and fourth toes are much longer than the second and fifth. The teeth are frequently as many as forty-four, and the molars are multituberculate. The *Hippopotamidæ* have the skin extremely thick, with scanty hairs; the head, body, and limbs extremely massive; and the four toes resting on the ground. The *Ruminantia* have never more than one pair of upper incisors. In the lower jaw, the canines closely resemble and are situated beside the six incisors, which thus seem to have increased to eight. The molars bear a double series of crescentic ridges, whence the name *Selenodonta* is frequently applied to the ruminant group. The stomach has at fewest three, and usually four divisions. Thus in the sheep or ox, the cardiac portion of the stomach is differentiated into the enormous *rumen*, or paunch, and the *reticulum*, or honey-comb stomach, with which it communicates. After the fodder has been chewed again, it passes readily into the third division, the *psalterium*, or manyplies, which acts as a filter, and allows only the finely-comminuted portions of the food to enter the highly glandular *abomasum*, or rennet stomach, in which gastric juice is secreted, and proteid digestion goes on.

The existing groups of ruminants are the *Tragulidæ*, the *Cotylophora*, and the *Camelidæ*. The *Tragulidæ* (sometimes erroneously termed musk-deer) are the least differentiated forms, and show interesting affinities to the non-ruminants. The *Cotylophora*, including the ox and deer tribes (Bovidæ and Cervidæ), are the central family, broadly distinguished by the cotyledonary placenta and the structure of their horns; those of the Cervidæ being naked, deciduous, and annually renewed processes of the frontal bones; while those of most Bovidæ (sheep, antelopes, oxen, buffaloes) are non-deciduous processes of the frontal bone, covered by the thickened and hardened epidermis known as horn. But

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in one sub-family, the giraffes, the horns arise as separate ossifications, and are covered by hairy skin.

The third family, the *Camelidæ*, are aberrant ruminants. They walk on broad integumentary cushions, developed below the phalanges of the third and fourth toes, which alone are developed, the nails not forming hoofs. Large pointed canines are present in each jaw. The stomach has a characteristic structure. The placenta is diffused. There are only two existing groups—the Camels of the old world, and the Llamas of the new.

ARTIODACTYLE, a. *-tĭl:* having an even number of toes. See RUMINANTIA: BOVIDÆ: DEER: also HOG: HIPPOPOTAMUS: ANTELOPE: SHEEP: OX: BUFFALO: GIRAFFE: CAMEL: LLAMA: ALPACA: etc.

AR'TISAN, n.: see under ART.

ARTIST, n. *ăr'tĭst* [L. *artem*, an art]: one who exercises any of the fine arts or crafts, particularly that of a painter, a sculptor, an architect, or a photographer. ARTISTE, n. *ăr-tēst'* [F. *artiste*, an artist—from L.]: a female painter, musician, singer, or dancer. ARTISTIC, a. *ăr-tĭs'-tĭk*, or ARTIS'TICAL, a. *-tĭ-kăl*, of an artist; according to a high degree of art. ARTIS'TICALLY, ad. *-lĭ.*

ARTOCARPACEÆ, *ăr'tō-kăr-pā'sē-ē:* n. ord. of monochlamydeous exogens, of which the Bread-fruit (*Artocarpus incisa*) is the type; nearly allied to that of *Moraceæ* (mulberries, figs, etc.), and, like it, by many botanists regarded as a sub-order of *Urticaceæ* (nettles, etc.). The distinction be-

Bread-fruit (*A. incisa*).

tween Artocarpaceæ and Moraceæ lies chiefly in the straight embryo and large cotyledons of the former. The fruit is often a *sorosis* (a single succulent fruit formed of the aggregated ovaries of a whole head of flowers), as in Bread-fruit (q.v.). There are upwards of fifty known species,

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natives exclusively of the tropics. The milky juice of some yields CAOUTCHOUC (q.v.); and that of a few species is so bland as to be used as a substitute for milk. See COW-TREE. The juice of others is, however, very poisonous, as that of *Antiaris toxicaria*, the Antjar poison, one of the poisons called Upas by the Javanese. The fruits are wholesome; the importance of the Bread-fruit in the South Sea Islands is well known; and the seeds of the *Musanga* of the Gold Coast of Africa, and of *Brosimum alicastrum* in the West Indies, are eaten as nuts. The fibrous bark of the Bread-fruit tree is made into cloth; its wood is used for building, its male catkins for tinder; its leaves serve as substitutes for table-cloths and wrapping-papers, and its milky juice for bird-lime. The bark of *Antiaris saccidora* is used in Western India for making sacks, which are formed by cutting a branch of the dimensions of the sack wanted, and simply turning back and drawing off the bark after it has been soaked and beaten, the wood being sawn off so as to leave a little portion to form the bottom of the sack. The fibrous bark of *Cecropia peltata*, or Trumpetwood, is used for cordage. The stem and branches are hollow, and are used for wind instruments. The wood of some species is valuable, such as *Letter-wood* (q.v.).

ARTOCARPUS, n. *ár'tō-kár'pŭs* [Gr. *artos*, bread; *karpos*, fruit]: the bread-fruit tree of the S. Sea Islands; the *Artocar'pus incĭsa.*

ARTOIS, *ár-twâ':* formerly a prov. of France, bounded by Flanders and Picardy, and almost corresponding with the modern department of *Pas-de-Calais* (q.v.). The cap. of A. was Arras. Louis IX., in 1239, made A. a county, and gave it to his brother Robert, who was succeeded by his son, Robert II., surnamed Posthumous, d. 1302. Afterwards it passed into the hands of Flanders and Burgundy, but was ceded to France by treaties in 1659 and '78. Charles X., in his early life, and also after his abdication, was known by the title of Count d'Artois.

ARTOTYRITE, n. *ár-tō-tī'rīt* [Gr. *artos*, bread; *turos*, cheese]: one of a sect in the primitive church who celebrated the Lord's Supper with bread and cheese, on the ground that the first oblations of men were not only the fruits of the earth, but their flocks (Gen. iv. 3, 4).

ARTS, DEGREES IN: ranks, or stages, in learning, gained by a student, and officially certified to by a proper collegiate or university faculty. The term 'Arts,' or 'Liberal Arts,' as technically applied to certain studies, came into use during the middle ages, and on the establishment of universities, the term 'Faculty of Arts' denoted those who devoted themselves to Science and Philosophy, as distinguished from the faculty of Theology, and afterwards of Medicine and Law. The number of 'Arts' embraced in the full mediæval course of learning was seven; Grammar, Logic, Rhetoric (constituting the *Trivium*), Music, Arithmetic, Geometry, and Rhetoric (the *Quadrivium*). The terms Master and Doctor were originally applied synonymously to any person engaged in teaching. In process of

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time, the one was restricted to the liberal arts, the other to Divinity, Law, and Medicine. When regulations were established to prevent unqualified persons from teaching, and an initiatory stage of discipline was prescribed, these terms became significant of a certain rank, and of the possession of certain powers, and were called *gradus*, 'steps' or 'degrees.' The passing of the initiatory stage, said to have been instituted by Gregory IX. (1227–41), conferred the title of *bachelor* (q.v.), and an additional course of discipline and examination was necessary to obtaining that of *master*. The title of Master of Arts originally implied the right, and even the duty, of publicly teaching some of the branches included in the faculty of Arts; a custom which is still retained to some extent in the German universities, but has fallen into disuse in Britain, France, and America, where the title is nearly honorary. See DEGREE. LL.A. (Literate in Arts) is a minor degree, recently instituted at some of the Scottish universities, and at St. Andrews is open to women. The degrees of Bachelor and Doctor of Science are granted for eminence in subjects some of which belong to the Faculty of Arts.

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ART UNIONS: institutions for the promotion of public interest in fine art, and for providing opportunities for disposal by sale of the approved works of artists. They are intended to supply the place of that encouragement which, at an earlier period, artists received from princes and prelates.

The origin of A. U., claimed by the Germans, seems to belong to the French in the days of the first Napoleon. From France they passed over into Belgium, where they established themselves even in the less important towns, ten years before they were introduced into Germany. The Art Union of Mechlin dates from 1812; the Art Union (*Kunstverein*) of Munich, established 1823, became the model of most of those which afterward arose. The most important was established at Düsseldorf, 1829, for the Rhine provinces and Westphalia, and has promoted the execution of works of art of the highest class; expending on such works in 20 years (1849-69) more than $200,000, and placing paintings on a large scale in public buildings. The Bohemian Assoc. at Prague, and those of Berlin and Cologne have wrought zealously in the same high line—the latter urging on the completion of one of the greatest architectural monuments of northern Europe—the cathedral of Cologne. The establishment of permanent galleries of art in the cities to which they respectively belong is also one of the higher objects of A. U.—The first A. U. in Britain was established at Edinburgh 1834.

The American A. U., established in New York 1838, had close relations with the Düsseldorf Assoc., and rose in eleven years to an income of over $95,000, and a membership of 18,960. It was discontinued 1849, under the state laws prohibiting lotteries. The lottery is certainly an unfortunate feature in the plan of the A. U., appealing for a noble end to ignoble motives

As regards the constitution of A. U., the following arrangements are common to them all. Each member, in return for an annual contribution (in Britain, usually a guinea), receives an acknowledgment, which acts as his ticket in the lottery by which the works of art, purchased with the sum thus contributed, are distributed among the members. Generally, a fixed proportion of the contributions is retained and devoted to the preparation of an engraving, presented to those who have drawn blanks in the lottery. The engraving is usually executed by a local engraver, after a work of the local school intended to be patronized. The association further makes provision for an exhibition, either permanent, as at Munich, or annual, as in London and Edinburgh, consisting mainly of the works of local artists, though most associations now admit those of strangers.

ARTVIN, *ärt-vēn:* town of Russian Armenia, on the Charuch; 34 m. s. of Batum. Pop. 8,000.

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ARUM, n. *ā'rŭm* [L. *ārum;* Gr. *aron*, supposed to be anc. Egyptian word]: a genus of spadiciflora endogens belonging to the nat. ord. *Araceæ* or *Aroideæ*. This order comprises herbaceous plants, some of which are stemless; shrubby plants, some of which are arborescent; and plants which climb by aërial roots, clinging to the trees of tropical forests. The leaves are sheathing at the base, convolute in bud, usually with branching veins. The flowers are male and female, naked, arranged upon a *spadix*, which is generally enclosed in a *spathe* (q.v.): the male flowers at the upper part of the spadix, and the female flowers at its base. The ovary is free. The fruit is succulent, the seeds pulpy, the embryo in the axis of fleshy or mealy albumen, with a lateral cleft in which the plumule lies; the albumen, however, is wanting in some plants of the order.—As thus

Arum maculatum.
a, leaves and root; *b*, spathe, with base of spadix exposed; *c*, fruit.

defined, this order contains almost 200 known species, natives chiefly of tropical countries; but some belong to colder climates. The N. Amer. representatives are Indian Turnip, Green Dragon, Arrow Arum, Water Arum, Skunk Cabbage, Golden Club, and Calamus.—The genus A. has a convolute spathe; the spadix naked at the point. In some species, a stench like that of carrion is produced during flowering, as well as a remarkable degree of heat. Plants are of course slightly warmer than the air around them, the heat being produced by the breaking up and oxidation of their protoplasm, and by the true respiration, in short, which goes on in all living tissues (see ANIMAL HEAT); but flowers, in general, are only 1°, or 1¼°, warmer than the air, whereas the flowers of some of the Arums

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and nearly allied plants are sensibly warm to the touch, and that of *A. cordifolium* has been found to have a heat of 121° F., while that of the air was only 66° F.—The only British species is *A. maculatum*, CUCKOW-PINT or WAKE-ROBIN, which is abundant in England and in most parts of Europe, growing chiefly in moist shady woods and under hedges. It has a tuberous perennial root; its leaves are all radical, on long stalks, strongly arrow-shaped, often spotted; the spathe greenish yellow, inclosing a rather short violet or brownish red spadix. It produces scarlet berries, 1–2 seeded, about the size of peas, clustered upon the spadix. The root has a burning acrid taste, which, however, it loses in drying or boiling. In a fresh state, it is a drastic purgative, too violent for medicinal use; indeed, it, as well as the leaves, is an active poison; yet a nourishing farina is prepared from it, after the acrid juice has been removed. This farina is a pure starch, and is known in England by the name of Portland Arrow-root. It was formerly prepared to a considerable extent in the isle of Portland, where also the tubers (corms) themselves are eaten by the country-people. A cosmetic called Cypress Powder is made from them in France, and they are used in Switzerland as a substitute for soap. They contain, indeed, a quantity of *Saponine*, to which their acridity is supposed to be owing. They lose great part of their acridity in drying, and were formerly used in medicine as a stimulant in impaired digestion, a diuretic in dropsies, and an expectorant in chest complaints. The plant is extensively cultivated in India for food.—*A. Indicum* is also much cultivated in Bengal for its esculent stems and small pendulous tubers.—Acridity in the juice, and the presence of an amylaceous substance of very nutritious quality, from which the acrid juice is easily separated, are characteristics of many plants of this order, particularly species of *Caladium* and *Colocasia*, much used for food in warm countries, under the names COCCO (q.v.) EDDOES, etc.—*Amorphophallus campanulatus* (*A. campanulatum*), called OL by the Bengalese, is very much cultivated in some parts of India for its roots (flat underground corms) which form a very important article of food; yet in a fresh state it is so acrid that it is employed as an external stimulant, and is also used as an emmenagogue. Other species of *Amorphophallus* are still more powerfully stimulant.—Two large species of *Arisæma*, another genus very closely allied to A., were found by Dr. Hooker to afford food to the inhabitants of the Sikkim Himalaya at an elevation of upwards of 10,000 feet. Their tuberous roots are bruised by means of wooden pestles, and thrown into small pits with water, until the commencement of acetous fermentation, when the acridity is mostly dissipated; but the process is so imperfect that cases of injury from the poisonous juice are frequent. The tubers of *Arisæma atrorubens* (*A. triphyllum* of Linnæus), a native of the United States, and there known as Dragon-root and Indian Turnip, yield a pure white starch like that of *A. maculatum*. Their medicinal uses also are similar; they are employed as a stimulant of the secretions. The DRAGON-PLANT, *A. Drac-*

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unculus, a native of the s. of Europe, is not uncommon in gardens in Britain, although it has a carrion-like smell, and its emanations are apt to produce headache and other disagreeable effects. It has a singular appearance—straight stalks, three feet high, curiously spotted like the belly of a snake.—The peculiar acridity of the *Araceæ* is most remarkably displayed in the DUMB CANE (q.v.).

AR'UN: river rising in St. Leonard's Forest, in the middle of North Sussex, Eng.; and after a course of 35 m., falling into the English Channel. A canal unites it with the Wey, a feeder of the Thames.

ARUNDEL, *ăr'un-dĕl*: small town 5 m. inland from the mouth of the Arun, in a tertiary and chalk district, on the s. side of the South Downs, in the s. w. of Sussex. It consists mainly of a very steep street rising from the right bank of the Arun to the summit of a hill crowned by a castle. The Arun is navigable for vessels of 150 tons up to the town. Bark and timber are the chief exports. A. was disfranchised by the Reform Bill of 1867. It is governed by a mayor, four aldermen, and twelve councilors. The castle, from its site, is a striking object, and was built soon after the Norman conquest. It is an oblong, including 5½ acres within its walls. It was laid in ruins during the civil wars of Charles I., but, being the baronial residence of the dukes of Norfolk, the late duke restored it to its former Gothic magnificence. The keep, containing the dungeon, is a circular Norman tower of imposing strength. Pop. (1881) 2,748; (1891) 2,644.

ARUNDEL, THOMAS, Archbishop of Canterbury in the reigns of Richard II., Henry IV., and Henry V.: 1353–1413, Feb. 20; second son of Robert Fitz-Alan, Earl of Arundel and Warren. He was first Archdeacon of Taunton, and at the early age of twenty-one he was, by the pope's appointment, consecrated Bishop of Ely. In 1388, he was, by the same authority, transferred to the archiepiscopal see of York. He was also for some years lord high chancellor of England. Having been banished the kingdom for taking a leading part in the first attempt which was made to deliver the nation from the oppression of Richard II., he was honorably received at Rome, and by Pope Boniface IX. nominated Abp. of St. Andrews, with a promise of future preferment in England. In 1396 he was enthroned, with great pomp, Abp. of Canterbury. He was a bitter persecutor of the Lollards and followers of Wickliffe, and a chief instrument in procuring the horrible act for the burning of heretics (*De Hæretico Comburendo*), passed in the reign of Henry IV. He even carried his bigotry so far as to solicit from the pope a bull for digging up Wickliffe's bones, which was wisely refused him. He also procured a synodal constitution, which forbade the translation of the Scriptures into the vulgar tongue. Among others whom he caused to be convicted of heresy, and sentenced to the flames, was Lord Cobham, one of the principal patrons of the new sect, at the commencement of the reign of Henry V. Soon after, A. was seized with an inflammation in the throat, from which he died.

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ARUNDELIAN, a. *ăr'ŭn-dēl'yăn* [from the Earl of *Arundel*]: a name applied to certain ancient marbles presented by him to the University of Oxford.

ARUNDEL MARBLES: part of a collection of ancient sculptures, formed about the beginning of the 17th c. by Thomas Howard, Earl of Arundel, and presented, 1667, to the Univ. of Oxford, by his grandson, Henry Howard, afterwards Duke of Norfolk. The principal portion of it is the 'Parian Chronicle,' consisting of the fragments of an inscription in marble, supposed to have been executed in the island of Paros, about B.C. 263. In its perfect state, this inscription contained a chronological table of the principal events in Grecian history from the time of Cecrops (B.C. 1582), to the archonship of Diognetus (B.C. 264). The chronicle of the last nineteen years is lost, and the extant portion of the inscription is much corroded and defaced. This curious and interesting monument, the authenticity of which has been questioned and maintained with almost equal ingenuity and learning, was purchased for the Earl of Arundel, with many other relics of antiquity, at Smyrna, by Mr. (afterwards Sir William) Petty. The inscription, and all the other principal sculptures in the Oxford Collection, are to be found fully illustrated in the relative publications of Selden, Prideaux, Maittaire, and Chandler, under the various titles of *Marmora Arundelliana* and *M. Oxoniensia*.

The A. M. were part of the superb collection of works of art, for the supply of which, from the treasures of antiquity, the Earl of Arundel engaged the services of two distinguished men of letters, Evelyn and Petty. This collection, rivalling the galleries of princes, was unfortunately dispersed after his death, and many of its choicest treasures were lost sight of. His collection of sculpture alone, when entire, numbered 37 statues, 128 busts, and 250 inscribed marbles, besides altars, sarcophagi, fragments, and gems.

ARUNDINACEOUS, a. *ă-rŭn'dĭ-nā'shŭs* [L. *arundo*, a reed]: resembling or having the structure of reeds. ARUNDINEOUS, a. *ăr'ŭn-dĭn'ĭ-ŭs*, abounding with reeds. ARUNDIFEROUS, a. [L. *arundo*, a reed; *fero*, to bear]: reed-bearing; cane-bearing.

ARUN'DO: see REED.

ARUSPICE, n. *ă-rŭs'pĭs*, or ARUSPEX, n. *a-rŭs'peks* [L. *arus'pex* or *harus'pex*, a soothsayer—from *hīra*, the intestine; *spĕcĭō*, I behold]: in *anc. Rome*, a diviner by the inspection of the entrails of beasts. ARUSPICY, n. *ă-rŭs'pĭ-sĭ*, the art of foretelling events by the inspection of the entrails of beasts slain in sacrifice.

ARVIC'OLA: see VOLE.

ARVONIAN, a. *ăr-vō'nĭ-an* [from *Arvonia*, the Roman name of a district of Wales]: pertaining to Arvonia. In *geol.*, the A. is a Pre-Cambrian formation found in Pembrokeshire, Carnarvonshire, and Anglesea. Dr. Hicks divides the Pre-Cambrian formation into *Dimetian*, *Arvonian*, and *Pebidian*. Each of these must have been many thousand feet in thickness, and their horizontal extension is very wide. The A. formation contains the quartz-felsites and porphyries, called *halleflinta* by Törell, and *petro silex rocks* by Hunt.

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ARYAN, a. *ăr'yăn* or *ăr'i-ăn* [Sans. *arya*, noble, of a good family: connected with *ar* in L. *arārĕ*, to plow, and perhaps with Gael. *ghrian*, proud; *Arii*, a tribe of High Asia, mentioned in Herodotus]: name applied to the Indo-European or Indo-Germanic race, and to their languages. As applied to a race it includes a family of nations, consisting of two branches, geographically separated, an eastern and a western. The western branch comprehends the inhabitants of Europe, and their descendants in America and elsewhere, with the exception of the Turks, the Magyars of Hungary, and the Finns of Lapland (see EUROPE); the eastern comprehends the inhabitants of Armenia, of Persia, of Afghanistan, and of Northern Hindustan. See HINDUSTAN. The evidence on which a family relation has been established among these nations is that of language. Between Sanskrit (the mother of the modern Hindu dialects of Hindustan), Zend (the language of the ancient Persians), Greek (which is yet the language of Greece), Latin (the language of the Romans, and the mother of the modern Romanic languages, i.e., Italian, French, Spanish, Portuguese, Wallachian), Celtic (once the language of great part of Europe, now confined to Wales and parts of France, Ireland, and Scotland), Gothic (which may be taken as the ancient type of the Teutonic or Germanic languages—including English—and of the Scandinavian), and Slavonic (spoken in a variety of dialects all over European Russia and a great part of Austria), the researches of philology have within the present century established such affinities as can be accounted for only by supposing that the nations speaking them had a common origin. No one of these nations, whether existing or historical, can claim to be the parent nation of which the others are colonies. The relation among the languages mentioned is that of sisters—daughters of one mother, which perished, as it were, in giving them birth. No monuments of this mother-language have been preserved, nor have we any history or even tradition of the nation that spoke it. That such a people existed and spoke such a tongue is an inference of comparative philology, the process of reasoning being analogous to that followed in the kindred science of geology. The geologist, interpreting the inscriptions written by the finger of Nature upon the rock-tablets of the earth's strata, carries us back myriads of ages before man appeared on the scene at all, and enables us almost to see one formation laid above another, and one plant or animal succeed another. Now languages are to the ethnologist what strata are in geology; dead languages have been well called his fossils and petrifactions. By skilful interpretation of their indications, aided by the light of all other available monuments, he is able to spell out, with more or less probability, the ethnical records of the past, and thus obtain a glimpse here and there into the gray cloud that rests over the dawn of the ages.

When these linguistic monuments are consulted as to the primitive seat of the Aryan nations, they point, as almost all ethnologists are agreed, to Central Asia, somewhere probably e. of the Caspian, and n. of the Hindu

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Kush and Paropamisan Mountains. There, at a period long previous to all European history—while Europe was perhaps only a jungle, or, if inhabited at all, inhabited by tribes akin to the Finns, or perhaps to the American Indians—dwelt that mother-nation of which we have spoken. From this centre, in obedience to a law of movement which has continued to act through all history, successive migrations took place towards the n. w. The first swarm formed the Celts, who seem at one time to have occupied a great part of Europe; at a considerably later epoch came the ancestors of the Italians, the Greeks, and the Teutonic peoples. All these seem to have made their way to their new settlements through Persia and Asia Minor, crossing into Europe by the Hellespont, and partly, perhaps, between the Caspian and the Black Sea. The stream that formed the Slavonic nations is thought to have taken the route by the north of the Caspian. At a period subsequent to the last n. w. migration, the remnant of the primitive stock seems to have broken up; part poured southwards through the passes of the Himalaya and Hindu Kush into the Punjab, and became the dominant race in the valley of the Ganges; while the rest settled in Persia, and became the Medes and Persians of history.

It is from these eastern members that the whole family takes its name. In the most ancient Sanskrit writings (the Veda), the Hindus style themselves Aryans; and the name is preserved in the classic Arii, a tribe of ancient Persia, Aria, the modern Herat, and Ariana, the district. Ariana, or Airyana, is evidently an old Persian word, preserved in the modern native name of Persia, Airan or Iran. *Arya*, in Sanskrit, signifies 'excellent,' 'honorable,' being allied to the Greek *ari*(stos), the best; or to the root *ar* (Lat. *arare*, to plow), distinguishing tillers (*earers*) of the earth from the nomadic Turanians. French savans limit the word *Aryan* to the eastern section of the Indo-European stock.

It should be mentioned that Latham's theory of the European origin of the Aryans was supported by Spiegel and Benfey, and still finds asserters: see Penka, *Origines Arianicæ* (1883), and O. Schrader, *Sprachvergleichung und Urgeschichte*. Some of the European languages would therefore be a truer representation of the original Aryan tongue than the Indic ones. The original home of the Aryan would be Scandinavia, or the neighborhood of the Baltic; and the Aryan himself, a coarse nomad, without metals, clothed in skins. Following the other view, Max Müller has drawn a picture of the Aryan family while yet one and undivided, in which the state of thought, language, religion, and civilization is exhibited in a multitude of details. Where the same name for an object or notion is found used by the widely spread members of the family, it is justly inferred that that object or notion must have been familiar to them while yet resident together in the paternal home. It is in this way established, that among the primitive Aryans not only were the natural and primary family relations of father, mother, son, daughter,

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hallowed, but even the more conventional affinities of father-in-law, mother-in-law, sister-in-law; that to the organized family life there was superadded a state organization with rulers or kings; that the ox and the cow constituted the chief riches and means of subsistence; and that houses and towns were built.

One general observation made by Müller is so interesting that we take the liberty of quoting it entire. 'It should be observed,' he says, 'that most of the terms connected with chase and warfare differ in each of the Aryan dialects, while words connected with more peaceful occupations belong generally to the common heirloom of the Aryan language. The proper appreciation of this fact in its general bearing will show how a similar remark made by Niebuhr, with regard to Greek and Latin, requires a very different explanation from that which that great scholar, from his more restricted point of view, was able to give it. It will show that all the Aryan nations had led a long life of peace before they separated, and that their language acquired individuality and nationality as each colony started in search of new homes—new generations forming new terms connected with the warlike and adventurous life of their onward migrations. Hence it is that not only Greek and Latin, but all Aryan languages have their peaceful words in common; and hence it is that they all differ so strangely in their warlike expressions. Thus the domestic animals are generally known by the same name in England and in India, while the wild beasts have different names, even in Greek and Latin.'

In this mainly pastoral life, the more important of the primitive arts were known and exercised: fields were tilled; grain was raised and ground into meal; food was cooked and baked; cloth was woven and sewed into garments; and the use of the metals, even of iron, was known. The numbers as far as a hundred had been named, the decimal principle being followed. The name for a thousand had not come into requisition until after the dispersion, for it differs in the different Aryan tongues.

Finally, it was among the yet undivided Aryans, while abstract language did not yet exist, while every word was a metaphor, and the setting of the sun, for example, could only be expressed by his growing old and dying, that those stories of gods, heroes, and monsters originated, which, with more or less of variety, but still with a family likeness, formed the pagan mythology of every member of the group.

ARYTENOID, a. *a-rĭt-ē'noyd* [Gr. *arutaï'na*, a pitcher; *eïdos*, resemblance]: resembling the mouth of a pitcher; in *anat.*, applied to two small cartilages at the opening of the larynx to which the vocal chords are attached.

ARZIGNANO, *ärd-zēn-yä'nō:* town of n. Italy, 11 m. w. by s. from Vicenza. Pop. 3,000.

AS, conj. prep. or ad. *ăz* [contr. of AS. *eallswa*, all so: Ger. *als*]: signifying agreement in manner in general; likeness of manner; for example: equally.

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AS, rel. pron. *ăz* [Icel. *es:* mod. Icel. *er*, rel. pron., as]: in old and common Prov. Eng., a relative pronoun used instead of *who, which*, and *that*, as, 'bring the box *as* stands at the fire-place'; 'he had a daughter *as* was named Hannah': see Skeat.

AS, n. *ăs* [L.]: the designation both of a Roman weight (called also *libra*) corresponding very nearly to an English *pound* (q.v.), and of a coin made of the mixed metal *aes*, or bronze. The As (coin) originally no doubt weighed a (Roman) pound; but it was gradually reduced to $\frac{1}{36}$ of a pound, and even lower. It is thus difficult to assign any fixed value to the As. About B.C. 270, the denarius (abt.

As.

17 cents) contained 10 ases; so that the value of the As was then a little less than 2 cents; when 16 ases went to the denarius, the value was about a cent. It was by the *sestertius* (q.v.) that money was reckoned at Rome. The oldest form of As usually bore the figure of an ox, a sheep, or other domestic animal (*pecus*); from which it is usually supposed that the Latin word for money, *pecunia*, is derived.

A'SA, third king of Judah: (reigned B.C. 955–914); son of Abijah, and grandson of Jeroboam. At the beginning of his reign, he was very young, and his character apparently undeveloped, for he allowed his grandmother, Maacah, to encourage idolatry; but on assuming the government, one of his earliest acts was to remove her from all authority 'because she had made an abominable image for an Asherah' (1 Kings, xv. 13; 2 Chron. xv. 16). His zealous efforts to extirpate the vices and impieties of the people were on the whole successful. He took away the Sodomites out of the land, and the altars of the strange gods, broke the images, and cut down the groves. For the next ten years he devoted himself to strengthening the defenses of his kingdom, and organized a magnificent army of more than half a million, which seems to have been looked upon as a menace by other monarchs, for one of these, Zerah the Cushite, took the initiative, and penetrating through *Arabia Petræa*, invaded Judah, but was defeated with immense slaughter. Before the battle commenced, Asa had invoked the aid of Jehovah; and some time after the victory, he and all his people entered into a solemn covenant 'to seek the Lord God of their father with all their heart and with all their soul' (2 Chron. xv.

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12). Peace lasted for twenty years in the kingdom, but in the 35th year of Asa's reign, war again broke out between him and Baasha, king of Israel. He sought and obtained the aid of the Syrian monarch, Benhadad; but at the expense of 'the treasures of the house of Jehovah,' and although successful against his adversary, he was indignantly upbraided and threatened by the prophet Hanani for not relying on Jehovah alone. Asa, flushed with success, threw the prophet into prison, and, it would appear, 'in his rage' oppressed some of the people at the same time—perhaps those only who sided with Hanani, for we know that at his death the nation honored him with a splendid funeral; and the sacred historian pays the highest tribute to his memory, declaring that 'Asa's heart was perfect with the Lord all his days.'

ASA DULCIS, *ăs'ă dŭl'sĭs* [i.e., Sweet Asa]: a drug in high repute among the ancients as an antispasmodic, deobstruent, and diuretic; also for supposed virtues of the most extraordinary kind, such as neutralizing the effects of poison, curing envenomed wounds, restoring sight to the blind, youth to the aged, etc. Its value was estimated by its weight in gold. The princes of Cyrene caused a figure of the plant producing it to be struck on the reverse of their coins, and it was sometimes called *Laser Cyrenaicum*. The plant is of the genus *Thapsia* (of the natural order *Umbelliferæ*), either *T. Garganica*, or a nearly allied species, *T. Silphium*—perhaps the drug was produced by both. They are natives of the s. of Europe and of Barbary, and appear to be very active purgatives.

ASAFETIDA, or ASSAFŒTIDA, n. *ăs'ă-fĕt'ĭ-dă* [L. *asa*, a gum; *fœtĭdus*, fetid: Ar. *asâ*, healing]: a gum-resin, which has been supposed to be identical with the exuded juice of the *Silphion* of Dioscorides, so highly esteemed among the Greek physicians; but which, perhaps, was the *Asa dulcis*. It name is perhaps derived from the Persian word *asa*, which means *mastic*. This drug is brought from Persia and Afghanistan, and is procured by drying the milky juice which flows from the root of the plant *Ferula* (*Narthex*) *A.*, which has been referred to the genus *Ferula* by Linnæus, and to *Narthex* by Dr. Falconer. The root of the A. plant is long and generally undivided; white inside, but having a black covering; and contains in its interior a quantity of juice of an overpowering odor, which much resembles that of garlic. *Ferula* or *Narthex A.* has its radical leaves tripartite, their segments bipinnatifid, and nearly two ft. in length. The gum-resin is said by some to be obtained also from *Ferula Persica*, a plant which has the root-leaves very much divided, and all either tripinnate or quadripinnate. The name *ferula*, like the Persian *asa*, refers to the appearance of the stem of the plant. *Ferula Persica* has long been propagated successfully in Britain, and even brings its seeds to perfection.

A. is prepared in the dry southern provinces of Persia, but chiefly in Khorassan and Afghanistan, and also to the n. of the Hindu Kush range of mountains. About April,

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the root-leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it. After six weeks, a slice is cut horizontally from its summit, and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry. The drug is sometimes brought to the market in the form of tears, but more frequently in lumps made up of irregularly shaped tears, agglutinated together by a softer substance. A. is extensively used in medicine, and has stimulant and anti-spasmodic properties. When taken internally it undergoes absorption, and may be detected in almost every secretion of the body, as the saliva, breath, and urine. According to the analysis of Pelletier, A. is composed of the following substances: resin, 65 parts; volatile oil, 3·6; gum, 19·44; bassorin, 11·66; various salts, ·30. In many parts of the East, this drug is used as a condiment, in which respect it seems to take the place of the garlic of some European nations.

ASAPHES, n. *ăs'ă-fēz* [Gr. *asăphēs*, dim, indistinct]: genus of Ichneumons, of which the best-known species, *A. vulgaris*, deposits its eggs in aphides, on which the larvæ, when hatched, prey.

ASAPH, ST., *sānt az'af:* cathedral city, a station on the Vale of Clwyd railway; on a small hill between the rivers Clwyd and Elwy, in the n. of Flintshire, Wales. The cathedral, on top of the hill on which the city is built, is cruciform, 178 ft. by 68 ft., with a tower 93 ft. high; one of the smallest of British cathedrals. It was built, 1284, on the side of a wooden structure founded before 596. Kentigern, or St. Mungo, Bishop of Glasgow, and his disciple St. A., are said to have founded the see of St. A. in the 6th c. The bishop, who has a revenue of £4,200, is patron of 121 of the 148 benefices in the diocese. St. A., with the Flint district of boroughs, returns one member to parliament. Pop. of St. A. (1891) 1,900.

ASAPHUS, n. *ăs'ă-fŭs* [Gr. *asăphēs*, obscure]: in *geol.*, a genus of trilobites, so named from the obscurity resting on their true nature, being at first confounded with insects. See TRILOBITE.

ASARABACCA, n. *ăs'ăr-ă-băk'ă* [L. *asărum*, wild spikenard; *bacca*, a berry]: *Asarum Europæum:* plant of the nat. ord. *Aristolochiaceæ* (see ARISTOLOCHIA); native of Europe, growing in woods; rare, perhaps not truly indigenous, in Britain. The whole plant has acrid properties; the roots and leaves are aromatic, purgative, and emetic. The use of A., however, as an emetic has been much superseded by that of ipecacuanha, which is milder and safer. The powdered roots and leaves enter into the composition of cephalic snuffs, which cause sneezing, and are employed as a counter-irritant in cases of headache, ophthalmia, toothache, etc. The plant contains a volatile oil, and a crystalline substance called ASARINE, *ăs'ăr-ĭn*, or ASARONE, to which it seems to owe its active properties. The genus *Asarum* is distinguished by twelve horned stamens, distinct from each other and from the style, and by a bell-shaped three-lobed

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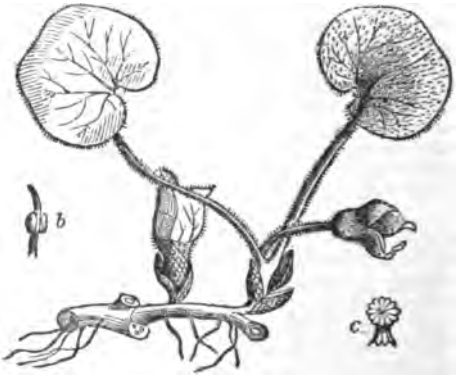
perianth. *A. Europæum* has a very short stem with two shining kidney-shaped leaves on long stalks, from the axil of which springs a single drooping greenish-brown flower. —A nearly allied species, *A. Canadense*, a native of N. Amer.



Asarabacca (*Asarum Europæum*).
***b*, detached anther; *c*, style.**

is stimulant and diaphoretic, and is used under the name of CANADA SNAKE-ROOT, instead of *Aristolochia Serpentaria*. It is also called WILD GINGER, and used as a spice, being of a warm aromatic quality, and not acrid, like its European congener.—Two other species, Va. and south.

ASARUM: see ASARABACCA.

ASBEFERRITE, n. *ăz-bĕ-fĕr'rīt* [Ger. *asbestos*, inextinguishable: L. *ferrum*, iron]: a grayish-white, or ash-gray mineral, a variety of amphibole. Dana classes A. with dannemorite under the head 'Iron-Manganese Amphibole.'

ASBEN, *ăs-bĕn'*, or A'IR: see AIR.

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ASBESTOS, n. *ăs-bĕs'tŏs*, or ASBES'TUS [Gr. *asbestos*, unquenchable]: a fibrous mineral of the hornblende family, having the fibres elastic and flexible, somewhat resembling flax, and which cannot be consumed by fire; the different varieties receive the names of *rock-wood*, *rock-cork*, *mountain-leather*, *fossil paper* or *flax*, etc. ASBESTINE, a. *ăs-bĕs'-tĭn*, of or like asbestos. ASBES'TIFORM, a. *-tĭ-fawrm* [L. *forma*, shape]: assuming the fibrous character of asbestos; like asbestos. ASBESTIC, a. *ăs-bĕs'tĭk*, pertaining to asbestos; made of asbestos. ASBESTOID, n. a mineral resembling asbestos in form; called also byssolite: ADJ. of the form of asbestos; fibrous.

ASBESTOS, *ăs-bĕs'tŏs*, or ASBES'TUS, *-tŭs*: mineral substance, var. of amphibole (when not fibrous serpentine), akin to hornblende, actinolite, and tremolite; like these, it consists chiefly of silica, magnesia, alumina, and ferrous oxide; but there are wide differences between specimens. It is mined in large quantities in Va., Md., N. Y., and other states, and in Canada. It consists of fine crystalline elastic fibres, of silky lustre, and varying in color from white to gray or green. Woven into cloth, it forms a fireproof texture. The most prized variety of A. is *Amianthus*, with fibres snowy white, long, and flexible; it occurs abundantly in Canada. The inferior qualities have shorter and less flexible fibres, and usually are of dark color; besides, they are of greater specific gravity: they are known as *common asbestos*, *mountain leather*, and *mountain wood*. The long-fibred A. is spun into threads, which are woven into fabrics used for filter-linings and for lagging in steam-boilers. The threads are used also for stuffing steam-pipe joints, and a large rope of them serves for piston-packing. Paper has been made of A., and would prove invaluable, in case of fire, for charters and other important documents, were it not that the writing disappears when the material has been subjected to a red heat. Patents have been granted in the United States upon methods of using A. for fire-brick and crucibles, as an absorbent in lamps and carburetters, as a boiler-covering, etc.; also as a material for coffins: instead of coffins made all of asbestos, it is usual now merely to line a wooden shell with A. paper. Roofing materials of A. consist of a roof-coating and a cement for repairing metal roofs. An A. felt is manufactured for use wherever steam-pipes, boilers, furnaces, etc., need to be confined to prevent radiation.

ASBJÖRNSEN, PETER CHRISTEN: 1812, June 15—1885, Jan. 6; b. Christiania, Norway: distinguished author. He studied at the university, and, 1858, was appointed superintendent of forests. His official duties gave him opportunity for collecting the popular tales of the peasantry; and he is known for his great collection of *Norwegian Folk-tales* (1842, extended with the help of J. Moe), and his *Norwegian Fairy Tales and Folklore* (1845; 3d ed. 1870).

ASBOLINE, *ăs'bō-lĭn* [Gr. *asbolos*, soot]: in *chem.*, a

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yellow, oily substance, very acrid and bitter, obtained from soot.

ASBOLITE, n. *ăz'bŏl-īt*, or ASBOLAN, *ăs'bŏl-ăn* [Gr *asbolainō*, to cover with soot]: called also earthy cobalt. Dana makes it a variety of wad, and considers it to be that mineral combined with oxide of cobalt.

ASBURY, *ăs'bĕr-ĭ*, FRANCIS: 1745–1816; b. Staffordshire, Eng.: ordained, 1784, the first bishop of the Meth. Epis. Church in the United States. Apprenticed to a mechanic in 1759, in Staffordshire, the preaching of an itinerant Meth. preacher turned his mind to religion, and two years later, at the age of 16, he began to preach in his own neighborhood. He became an itinerant, 1767, preached for three years in England, and was sent, 1771, as a missionary to America. John Wesley appointed him general assistant for this country. In his new and responsible position, A. soon infused fresh vigor into the cause in America, dispatching missionaries all over the country, organizing new societies, and preaching with great force and eloquence. He remained in the colonies during the Revolutionary war, showing great discretion. In 1784, it was determined to establish an independent Meth. Epis. Church in America, and A. was made joint superintendent with Thomas Coke, who had been ordained by Mr. Wesley. In the following year the first Meth. college in America was founded. A. was a passable Greek and Hebrew scholar, though without a university education. He never married, from a determination to devote himself to his great work. The statistics of his professional career are remarkable: he is said to have travelled over 270,000 m., presided at 224 conferences, ordained more than 4,000 ministers, and preached more than 16,000 sermons. He left three vols. of his 'Journals,' which are highly esteemed.

ASBURY PARK, *ăs'bĕr-ĭ:* post-village in Ocean tp., Monmouth co., on the Atlantic Ocean, N. J., 6. m. s. of Long Branch; 51 m. from New York. It is a favorite summer resort, covering abt. 500 acres, handsomely laid out, with a public hall, free reading-room, and other advantages. It contains a number of large hotels and numerous boarding houses, and the drives in the vicinity are attractive. Between Asbury Park and Ocean Grove is Wesley Lake, about three quarters of a m. long, a beautiful sheet of water devoted to boating. Pop. abt. 4,000; summer visitors number above 20,000.

ASCALAPHUS, n. *ăs-kăl'ă fŭs* [Gr. *askalaphos*, a word in Aristotle, apparently meaning a kind of owl]: genus of neuropterous insects belonging to the family *Myrmeleontidæ*, or Ant-lions. They differ from the Myrmeleon proper in having much longer antennæ and shorter bodies, while their larvæ do not construct a pitfall.

AS'CALON, or ASH'KELON: ruined city of Palestine, on the shore of the Mediterranean, 36 m. w.s.w. of Jerusalem. Its name occurs often in the Old Testament. It was in ancient times a fortified city, and the principal town of one

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of the five lordships of the Philistines. Herod the Great embellished it with baths, palaces, and fountains; but it suffered in the wars with the Romans. There was a celebrated temple of Derketo, the Venus of the Syrians, at A. After continuing long under the dominion of the Roman empire, the city came into the possession of the Saracens in the 7th c. In 1099, a great battle was fought on the plains of A., between the Crusaders and Saracens, when the Christians gained a decisive victory. The city, however, a number of years after, was recaptured by the Moslems, and held by them as a strongly fortified place until 1153, when it was taken by the Crusaders under Baldwin III. In 1187, it was retaken by the Saracens, but afterwards (1192) fell into the hands of Richard Cœur de Lion. Subsequently, being more than once dismantled and repaired during the wars between Richard and Saladin, it was reduced to desolation by Sultan Bibars in 1270.

The ruins of this ancient city occupy an extensive semicircular eminence, sloping gently to the e., but abrupt and steep towards the sea. Part of the walls are still standing, with the remains of Gothic churches, a palace, and several edifices of more ancient date, which attract the notice of the traveller and the antiquary.

ASCANIUS, *ăs-kā'ne-oos:* abt. the middle of the 18th c.: Swedish naturalist and inspector of mines in the n. of Norway. He was a correspondent of Linnæus, and published a work on natural history.

ASCANIUS, *ăs-kā'nĭ-ŭs*, also called IULUS: according to Virgil and Livy, the son of Æneas and Creusa, and founder of Alba Longa. One tradition says he succeeded his father as king of the Latins. The Julia gens of Rome claimed him as an ancestor.

ASCAPART, *ăs'kā-pârt:* a giant 30 ft. high, said to have been conquered by Sir Bevis of Hampton, whom with his wife and horse, A. carried under his arm. He is represented on the city gates of Southampton, Eng. Shakespeare, Pope, and others allude to him.

ASCARIDES, n. plu. *ăs-kăr'ĭ-dēz*, sing. AS'CARIS [Gr. *askăris*, a long round worm in the bowels]: the small intestinal thread-worms. See ASCARIS.

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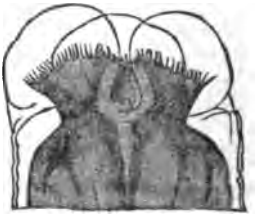
ASCARIS, *ăs'kă-rĭs:* genus of *Entozoa*, or intestinal worms, of the ord. *Nematoidea* of Cuvier and others. The ascarides have a body approaching to cylindrical, but thickest in the middle. They inhabit the intestines of animals. The species are numerous. One of the best known is *A. lumbricoides*, often called the common round worm, which occurs in the intestines of man and of some of the lower animals, as the hog, ox, horse, etc., and which often occasions severe disease, and sometimes death, particularly when it ascends from the intestines to the stomach. Its presence even in its most ordinary situation in the small intestines is attended with unfavorable effects upon the

Ascaris lumbricoides (male).
One-third of the true linear dimensions; *a* is the head of the worm.

general health; and the greater the number present—which, however, is not usually large—the greater, of course, is the injury; although when they remain in the intestines, worms of this species are less injurious and less annoying than other and even much smaller intestinal worms. In subjects otherwise diseased, they occasionally find their way out of the intestines into the closed serous cavities of the body, and even pass through ulcerated parts of the external integument; but the mouth is formed only for suction, and is provided with no means of boring



The mouth of Ascaris lumbricoides, magnified.
Showing the fleshy tubercles spread out, with cockscomb-like muscles interior to them, and the entrance to the intestinal canal.

through the healthy intestine. An immense number of remedies (anthelmintics or vermifuges) have been proposed and used to expel this parasite, some of which are very effectual. They do not in general kill the worms, but act by making their dwelling-place disagreeable to them. See VERMIFUGE. It is, however, remarked by Küchenmeister, in his work on Parasites, that the treatment of cases of this description is as yet purely empirical, because, although there must be a condition of the intestinal canal which favors the thriving of worms, we are by no means certain what it is.

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ASCARIS.

The *A. lumbricoides* is ordinarily, in size and appearance much like the Common Earthworm (*Lumbusri cterrestris*), from which resemblance it has received its specific name, although the resemblance is rather in general form than in more essential characteristics. It has been seen fifteen inches in length. Its mouth consists of three fleshy tubercles, which can be spread out upon the intestine to form a broad circular sucker, and within which there is a small tube capable of being protruded. The alimentary canal consists of a muscular gullet and stomach, and a thin-walled intestine. Between the muscular layers of the body is produced a pale reddish oily matter, with a strong

Ascaris vermicularis (male). Magnified twenty-five diameters; *a*, the mouth.

Ascaris vermicularis (female). Magnified eight diameters.

and very peculiar odor, which is gradually communicated to spirit in which the worm is preserved. The males are smaller than the females, and much more rare. The females produce eggs in great numbers; but it is uncertain if ever they are developed within the intestine in which the parent worm resides. They are certainly capable of being developed elsewhere, and probably the young enter the intestines of the animals of which they are eventually to be the parasites, after having spent a certain stage of their existence in very different circumstances; the worm in a very young state having never been found in the intestines of man or of quadrupeds, the situation of its per-

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fect development. The inhabitants of damp valleys are believed to suffer more than others from the *A. lumbricoides*. It is said also to be particularly frequent in persons who are much accustomed to eat raw leaves and roots; and it has been supposed that the young may exist, perhaps in an encysted state, in the bodies of insects or other very small animals which are accidentally eaten along with such food, as the young tapeworm finds its way into the human intestines from its residence as a creature of very different size and form in the flesh of the sheep or the pig. The once prevalent idea of the equivocal generation of these worms is now completely abandoned.

A. vermicularis is another species usually referred to this genus, and is the only other species troublesome to mankind. It is known as the Thread-worm or Maw-worm, and is very common both in children and in adults. It infests chiefly the lower part of the intestines, and particularly the rectum, great numbers being often present together, and occasioning intolerable itching, irritation, and loss of sleep, although there is not in general much serious injury to health. The same anthelmintics employed against other intestinal worms are found efficacious also in the expulsion of this; and clysters are often employed with great success. The thread-worm is white, not more than half an inch in length, the male much less. Some recent authors of high reputation have separated this species from A., and call it *Oxyuris vermicularis*, but the term *Ascarides* is often employed in medical works with exclusive reference to it; and indeed this name, derived from the Greek *askarizo*, to jump or move briskly, probably owes its origin to the liveliness of motion which this species exhibits. It has been recently discovered that its nervous system is very highly developed, consisting of many ganglia, with connecting and ramifying cords.

ASCELLI: see ASCUS.

ASCEND, v. *ăs-sĕnd'* [L. *ascend'ĕrĕ*, to ascend—from *ad*, to; *scando*, I mount up; *scansus*, mounted up: It. *ascendere*]: to mount up; to go up; to rise. ASCEND'ING, imp.: ADJ. in *bot.*, rising erect from the ground and forming a curve; applied to ovules attached a little above the base of the ovary. ASCEND'ED, pp. ASCENDABLE, a. *ăs-sĕnd'ă-bl*, that may be ascended. ASCEND'ANT, a. superior; surpassing; in *astron.*, above the horizon: N. commanding influence; superiority. ASCENDENCY, n. *ăs-sĕnd'ĕn-sĭ*, power; controlling influence. ASCENSIVE, a. *ăs-sĕn'sĭv* [L. *ascensus*, mounted up]: rising or tending to rise. ASCENSION, n. *ăs-sĕn'shŭn*, the act of going up. ASCENSIONAL, a. *-ăl*, pertaining or relating to. ASCENT, n. *ăs-sĕnt'*, act of rising; rising of a hill; an eminence. RIGHT ASCENSION, in *astron.*, the arc of the equinoctial intercepted between the first point of Aries and the circle of declination passing through the place of the heavenly body. ASCEN'SION-DAY, n. the day on which our Lord's ascension is commemorated. —SYN. of 'ascend': to mount; arise; rise; climb; scale; tower; soar;—of 'ascendency': influence; sway; prevalence; domination; control; authority; dominion.

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ASCENSION, *ăs-sĕn'shŭn:* one of the comparatively few single islands on the globe, being about 800 m. n.w. of St. Helena, and almost as far to the s.s.w. of St. Matthew. It is said to have received its name from its discovery by a Spanish navigator on Ascension-day. It is nearly in the middle of the South Atlantic, the lat. of its fort being 7° 55′ 55″ s., and its long. 14° 25′ 5″ w. A. is 8 m. long by 6 broad; about 35 sq. m. Though discovered as early as 1501, yet it remained uninhabited till 1815, when, in connection with Napoleon Bonaparte's detention in St. Helena, the English took possession of it. It is now used as a naval victualling-station and hospital. Like St. Helena, it is of volcanic origin, and generally mountainous—one peak rising to a height of 2,870 ft. From the extreme dryness of the climate, which, however, is healthful, the surface is nearly destitute of verdure. Among indigenous productions are the tomato, castor-oil plant, and pepper; European vegetables are cultivated. Pop. (1871) 27, 15 being residents on the island, and 12 being in the Royal Naval Hospital. See Mrs. Gill's *Six Months in A.* (1879).

ASCENSION, RIGHT [Ger. *gerade aufsteigung*]: in *astron.* one of the arcs which determine the position relatively to the equator of a heavenly body on the celestial sphere, the other arc being the declination. See ARMILLARY SPHERE (under ARMILLA). It is the arc of the equator intercepted between the first point of Aries (q.v.), and the point at which the circle of declination passing through the star cuts the equator. Measured always from w. to e., right A. on the heavens corresponds to longitude on the earth. The right A. of a heavenly body is ascertained by means of the transit instrument and clock. The transit instrument determines its meridian passage, and the transit clock gives the time at which this takes place. When the first point of Aries is in the meridian, the clock stands at 0 hours, 0 minutes, 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock, therefore, at the passage of any heavenly body gives its right A. in time, and this, when multiplied by 15, gives the same in degrees, minutes, and seconds. The right A. is usually given, however, in time. The old term, *oblique* A., was given to the right A. of the point of the equator that rose simultaneously with the heavenly body; and the difference of the oblique and right A. was called the 'ascensional difference.'

ASCEN'SION-DAY, or HOLY THURSDAY: day on which Christ's ascension is commemorated; one of the great religious festivals of the Christian Church, traceable from about the middle of the 4th c. It occurs on the fortieth day after Easter (Acts, i. 3). Connected with the religious observances of this day were certain civic ones; which in some parts of England and Scotland are continued to this day—viz., *beating the bounds, or riding the marches*—though their religious connection is apparently forgotten. See ROGATION DAYS: PERAMBULATION.

ASCERTAIN, v. *ăs'sĕr-tān'* [OF. *acertainer*—from L.

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ad: F. *certain*, certain—from L. *ad*, to; *certus*, sure]: to make certain; to make sure by examination; to establish. As'CERTAIN'ING, imp. As'CERTAINED', pp. *-tānd'*. ASCERTAINABLE, a. *ăs'sĕr-tān'ă-bl*, that may be made sure of by search or examination. ASCERTAINMENT, n. *ăs'sĕr-tān'mĕnt*, establishment; discovery. As'CERTAIN'ER, n. one who.

ASCETIC, n. *ăs-sĕt'ĭk* [Gr. *askētikos*, relating to the practice of anything; *askētos*, exercised, practiced; *askēsis*, the discipline practiced by the wrestlers]: one unduly rigid or austere; one who retires from the world: ADJ. retired from the world; austere; also ASCET'ICAL, a. *-ĭ-kăl*. ASCET'ICS, n. *-ĭks*, a treatise on the subject of asceticism or giving rules to be observed by ascetics. ASCETICISM, n. *ăs-sĕt'ĭ-sĭzm*, the practice of ascetics. Among the Greeks, *askēsis* denoted the exercise and discipline practiced by the athletes or wrestlers, who had to harden their bodies by exertion and to avoid all sensual and effeminating indulgences. In the schools of the Greek philosophers, especially of the Stoics, the word which signified the discipline practiced by the wrestlers, signified the practice of mastering the desires and passions, or of severe virtue. In these senses it passed into the language of the early Christians. The language of the apostle Paul in comparing the Christians to wrestlers who had to contend with Satan, the world, and the flesh, contributed to this. But the philosophy of the time had more to do with it, which held the freeing of mind from matter to be the means of union with God; or, at least, that the refraining from all luxurious pleasure was the way to restore the soul to its original purity. To understand the vast influence that ascetic ideas have exercised on the Christian religion, we must look beyond the bounds of the Christian history. Their root lies in the oriental notion, that the Absolute or All is the only real existence; and that individual phenomena, especially matter in all its shapes, are really nothing, and are to be despised and avoided, as involving the principle of separation from the Absolute. The East, accordingly, is the native soil of A. The glowing imagination of the oriental carries the practice of it to a monstrous extravagance, as is seen in the frightful self-tortures inflicted by the yogins (see YOGA) and fakirs (see FAKIR), the suicides in the sacred Ganges and otherwise, and the practices recently prevalent of offering children in sacrifice, and of burning widows; most of which, however, have been suppressed by the British government. Buddhism, which may be considered as a kind of puritan revival or reformation—the Methodism of the Indian religion—carried the principle beyond its previous bounds. In its contemning the world; in its inculcating a life of solitude and beggary, mortification of the body, and abstinence from all uncleanness and from all exciting drinks, the object was to keep as distant and detached as possible from this 'Vale of Sorrow.' See BUDDHISM and NIRVANA. The sober Chinese, and the more moral and rational Persians, never carried asceticism to these extravagances; and the earnest Egyptians sought to confine it to monogamy of the priests, abstaining from the flesh of swine and from beans, rigid

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purity, circumcision, moderate flagellation, and frequent contemplation of death (for which there were remembrancers provided, even in the midst of festivities). These are certainly milder forms of A., but the principle is the same.

It is in the light of this fore-history that we must consider Judaic and Christian asceticism. In the oriental mind, especially in Egypt, circumcision, avoiding of all uncleanness, and fasting, were signs of humiliation before God; and in the Mosaic ritual they were conditions of the favor of the holy Jehovah. Voluntary vows, abstaining even from lawful food, wine, etc., were held to have a special purifying, consecrating efficacy, particularly for prophets and men of special callings. But self-castigation was foreign to the sobriety of Judaism, and even hermitism came into established practice only shortly before Christ, in Palestine among the Essenes (q.v.), in Egypt among the Therapeutæ (q.v.), though doubtless Jewish A. had become more stern and gloomy since the exile in Babylon.

A. was far less congenial to the reflective nations of the West, above all to the cheerful Greeks. A Greek felt himself entitled to enjoyment as well as his gods; hence Greek religious festivals were pervaded by cheerfulness. The only exception appears to be the Eleusinian mysteries, which never took hold of the people generally, and the passing phenomenon of the Pythagorean fraternity. The attack made by the Socratic school upon the body as the prison of the soul—a view reminding one of the East—and the extravagant contempt for the elegances, and even decencies, of life professed by the later Stoics and Cynics, were no genuine fruits of the popular Greek mind; and we must also ascribe to the infusion of oriental philosophy the ascetic tendencies of Neoplatonism, in holding abstinence from flesh and from marriage as chief conditions of absorption into the divinity.

It was into the midst of these ideas that Christianity was introduced. The Jewish converts brought with them their convictions about fasting. Fasting and Nazaritic observances were thought sanctifying preparatives for great undertakings; and the inculcation of abstinence from marriage, on the ground of the expected speedy reappearance of Christ, falls in with the same notion, namely, that the flesh, that is, the sensuous part of our nature, is the seat of sin, and must therefore, first of all, be rigorously chained. The oriental traditions of A.; the spirituality of Christianity, pointing away from earth to heaven; opposition to the corruption of the heathen world; the distinction made between belief and knowledge, as a higher and lower stage of intelligence, leading to a corresponding distinction of a higher and lower stage of virtue,—all combined to make the Christians of the first two centuries hold aloof from the world and its wisdom, and favor abstinence from marriage, more especially on the part of the clergy. This ascetic spirit began as early as the commencement of the 2d c. to court trial in the perilous practice of men and women living together under vows of continence. We find Cyprian dissuading from the dangerous experiment, and even the authority of

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the church interposed to the same effect. But during the first three centuries no irrevocable vows yet bound the devotees to a lifelong A. Fasting was also comparatively rare.

But the tendency to outward manifestations began to grow stronger. The inward and spiritual life of the Christians had greatly declined; and if the previous bloody persecutions had driven individuals from human society into the deserts, the growing secularization of the church, after Christianity became the state religion, had the same effect to a still greater degree. All this paved the way for the chief manifestations of A.—namely, monasticism, which the church deemed herself compelled by the overwhelming tide of opinion within and without to recognize, and take under her charge. See MONACHISM. From the African Church, represented by Tertullian and Augustine, a spirit of gloomy and crushing supernaturalism spread deeper and deeper over the Western Church generally, intensifying the ascetic tendencies, and leading to still more marked separation from a despised world. There were not wanting healthier minds—as Jovianus, Vigilantius, and others—to raise their voices against fasting, monkery, and the outward works of A. generally; but such protests were vain, and became more rare.

From the 11th c., the Cathari, Waldenses, and other sects, though themselves ascetics in some sense, yet assailed the external A. of the church; the classic Petrarch fought on the same side; and so did Wickliffe, Huss, and Jerome of Prague, in their premature struggle at reformation. After a preliminary skirmish by Erasmus, the struggle was decided in the reformation of the 16th c. The fundamental principle of that movement, that salvation is secured by justification through faith, and not through dead works, struck at the root of monkery and mortification in general. But the victory has not been so complete as is often assumed. The ascetic spirit often shows itself still alive under various disguises even in Protestantism. The Mennonites inculcated a rigid A.; and with the Shakers of America, celibacy is practiced as a virtue. The essence of A. is to hold bodily self-denials and suffering to be meritorious in the sight of God, in and for themselves, without regard to their promoting the good of others or their improving the individual's own character. In this light, some traits presented by the earlier Puritanism, Methodism, and Quakerism may appear ascetic. It is not impossible that vegetarianism, total abstinence, and other recent austerities, though advocated on other grounds, recommend themselves to the feelings of many from their falling in with this deep-seated propensity to A., which seems a perverted development from the great truth that *subjection* to the flesh degrades man's spirit.

Even in the Roman Church, ascetic practices have been modified in recent times; fastings are less rigorous, and the self-sacrifice of conventual life is more directed to beneficial ends. Mohammedanism has undergone the same change. In the Greek Church, monasticism had always a milder form.

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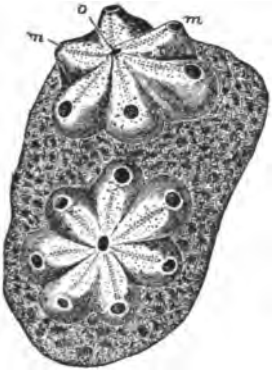
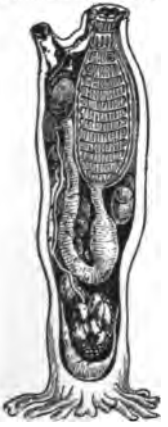


Compound **Ascidian** (after Milne-Edwards). Rosettes of 6 or 7 united individuals, with separate inhalent, but united exhalent apertures; *m*, the inhalent aperture; *o*, the common exhalent apertures. The colonies are attached to a piece of seaweed.

Ferula Asafetida.

As (half real size).—Specimen in British Museum.



Structure of a simple Ascidian, showing inhalent aperture, leading into respiratory pharynx; looped alimentary canal, opening along with genital duct into cloacal chamber; nerve ganglion between inhalent and exhalent apertures; reproductive organs near the base, eggs in body-cavity, etc.; heart at very base; fixing processes. (After Hæckel.)

Artichoke.

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ASCH, *ăsh:* t. in the w. of Bohemia, 14 m. w.n.w. from Eger. It has cotton, silk and woolen manufactures. Pop (1880) 13,209.

ASCHAFFENBURG, *ä shăf'fĕn-bŏrg':* chief t. on the right bank of the Maine, in the Bavarian district of Unterfranken; lat 50° 1′ n., long. 9° 7′ e. It is built upon an eminence, and has both a healthful and attractive situation; but the streets are narrow, irregular, and slope steeply towards the river. The castle of Johannisberg, built 1605–14, by Johann Schweikhardt, elector of Mentz, and the favorite hunting residence of many of his successors, forms a quadrangle, with towers at each corner, and overlooks the whole town. Besides the collegiate church, the military barracks, and the town hospital, A. possesses a Roman villa, built by King Louis I., 1849, in imitation of the Castor and Pollux edifice discovered at Pompeii. A. is celebrated for its manufacture of colored papers; it has considerable trade in wood, building-stone, tobacco, wine, etc. A. existed as early as the invasion of Germany by the Romans, who built a castle here. In 974, Otto I., Duke of Swabia and Bavaria, founded the collegiate church, which greatly increased the prosperity of the place. After Otto's death the town came into the possession of the abps. of Mentz, and remained with them until the dissolution of the Germanic empire. In 1814, with the principality of which it is the capital, it was ceded to Bavaria. Pop. (1894) 13,630, principally Rom. Cath.

ASCHAM, *ăs'kăm*, ROGER: 1515—68; b. Kirby Wiske, Yorkshire: distinguished English writer and classical scholar. He received his early education in the family of Sir Anthony Wingfield, and in 1530 entered St. John's College, Cambridge, where he took his degree of B.A., 1534. The study of the classics, especially Greek, had recently been revived at Cambridge, and the natural bent of A. impelled him with ardor to these studies. His reputation as a classical scholar soon brought him numerous pupils; and in lack of a Greek chair at that time, he was appointed by the univ. to read lectures in the public schools. He at first opposed the then new method of pronunciation, still used in England; but afterwards adopted and defended it. His leisure hours were given to music, penmanship, and archery. In defense of the latter art, he wrote, in 1544, a treatise entitled *Toxophilus*, the pure English style of which, independently of its other merits, ranks it with classical English literature. For this treatise, dedicated to Henry VIII., he was rewarded with an annual pension of £10, equivalent to about £100 of the present money. About the same time, he was appointed university orator. In 1548, on the death of his former pupil, Grindal, he was called to supply his place as master of languages to the Lady Elizabeth. In this office he gave the highest satisfaction; but at the end of two years abruptly resigned it, on account of some offense he had taken at some persons in the princess's household. That he did not lose favor at court, however, is manifest, from his

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having soon been appointed secretary to Sir Richard Morysin, ambassador to the court of Charles V. He spent three years in Germany, and published an account of his observations in that country. He also made a short tour in Italy. During his absence, he had been appointed Latin secretary to Edward VI. On his return, after the death of the king, the interest of Gardiner, Bp. of Winchester, secured his appointment to the same office under Mary; his pension also was doubled. His prudence and moderation preserved him from offending by his Protestantism. After the death of Mary, Elizabeth retained him at court in the double capacity of secretary and tutor, which he discharged till his death. His principal work, *The Schoolmaster*, a treatise on classical education, was pub., 1571, by his widow. His Latin letters and poems have been frequently reprinted. The best edition of the former is that of Elstob (Oxford, 1708). To an edition of his English works, by the Rev. J. Bennet (1767), is prefixed a life by Dr. Johnson.

ASCHAM, a case for the reception of the bow, arrows, strings, and other accoutrements of the archer, derives its name from the author of the *Toxophilus*.

ASCHERSLEBEN, *ăsh-ĕrs-lā'bĕn:* t. in the dist. of Magdeburg, prov. of Prussian Saxony; lat. 51° 46′ n., long. 11° 27′ e.; on the river Eine; 32 m. distant from Magdeburg. The inhabitants are occupied chiefly in agriculture and gardening; its trade is not very important. It has, however, considerable manufactures of woolens, linens, earthenware, etc. Pop. (1880) 19,501; (1890) 22,865.

ASCIDIA, n. plu. *ăs-sĭd'ĭ-ă*, or *ăs-kĭd'ĭ-ă*, or ASCID'IANS, n. plu. *-ĭ-ănz* [Gr. *askidion*, a little bag]: small marine organisms, belonging (with the Salpidæ) to the *Tunicata*. The classification of the *Tunicata* has been much debated. Once grouped with the Mollusca, they, the Polyzoa, and Brachiopoda were subsequently separated from the mollusks, and made to constitute the *Molluscoidea;* while recently the affinities of the A. with the Vertebrata have had special interest in connection with the theory of development. See MOLLUSCA: POLYZOA: ZOOLOGY: DARWINIAN THEORY. The ascidians, with the other *Tunicata*, are acephalous, or destitute of a head, and are enclosed, not in a shell, but in an elastic tunic with two orifices, composed of a substance apparently identical with the *cellulose* of plants, consisting only of carbon and hydrogen. Within the external tunic is a muscular membrane, regarded as corresponding to the *mantle* of other mollusca, and the openings of which agree with those of the tunic. The greater part of the cavity of the mantle forms a branchial sac, the lining of which, folded in various ways, constitutes the gills (*branchiæ*); and into it, by the respiratory movements, currents of sea-water are continually brought, passing out through the vent or anal orifice. Multitudinous *cilia* in the mouth and branchial sac cause by their action this continual flow of water. The motion of the cilia is apparently quite involuntary. By this flow

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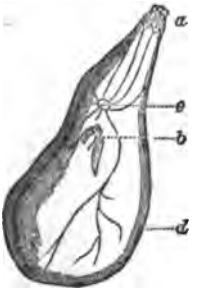
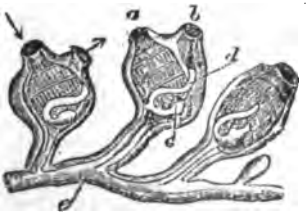
of water, the particles of food requisite for the animal are brought in, so that the aeration of the blood and the supply of the stomach are carried on together and by the same means. The esophagus or gullet opens from the branchial sac, which is indeed regarded as probably an expansion of the upper part of it—a dilated pharynx. Under the branchial sac is the stomach; and the alimentary canal, which is more or less tortuous, finally returns upon itself, so that the two orifices are not far separate. The liver consists of follicles produced into tubes, and communicating with the stomach by a single opening. There is a heart and a circulation of blood, with the remarkable peculiarity of alternations in its course, the circulation every now and then pausing and being reversed. The transparency of many of the ascidians permits these and other internal movements to be easily observed. The nervous system is very simple, consisting of a single ganglion, situated between the mouth and the anal orifice, sending out filaments to both of them, and other branches over the surface of the mantle. The mantle is capable of contracting suddenly to eject a jet of water, and with it any body the presence of which is disagreeable. The mantle contracts and ejects water, also when the animal is touched, and this appears to be the only means of defense. There is no trace of eyes or other organs of special sense.



Nervous System of Ascidian.

a, mouth; *b*, vent; *c*, ganglion; *d*, the mantle (the external tunic being removed).

The ascidians are found in all seas, and often constitute an important part of the food of fishes. Some of them are occasionally used as human food, as *Cynthia microcosmus* on the shores of the Mediterranean. Many of them



Section of Social Ascidian.

a, mouth; *b*, vent; *c*; stomach; *d*, intestinal canal; *e*, common tubular stem.

are very small, but some attain a size of five or six inches in diameter, and when touched eject water to a considerable height, the largest of them to about three feet. They are all fixed by the base, in their mature state, to some

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solid substance, as a rock or seaweed; sometimes by the intervention of a stalk or peduncle. In some kinds (*Social Ascidians*), the peduncles of a number of individuals are connected by a tubular stem, and to some extent they have a common circulation of blood, although each has its own heart, respiratory apparatus, and digestive system; and if a ligature is drawn around the peduncle of one so as to cut it off from the common circulation, circulation takes place in it as in a solitary ascidian. In other kinds (more strictly called *Compound Ascidians*—which designation, however, is by some authors applied to those just described, while these are called *Aggregate Ascidians*), the tunics of many are united into a mass, and they form systems like zoophytes. The compound system sometimes bears a general resemblance to an actinia. Very frequently it forms a slimy crust upon algæ, shells, etc., or projects in globular or conical masses, 'more like a lump of inanimate matter than a being endowed with vitality'—'a curious and interesting internal organization, veiled by the coarsest exterior.' The individuals are sometimes connected by a gelatinous flesh, which consists of cellulose, and there is sometimes a calcareous deposition in this connecting substance as in the compound polyps. The individuals in these systems have always sprung by gemmation from one, and both the solitary and compound ascidians propagate by eggs. The young have the power of active locomotion, resemble tadpoles in form, and swim by means of a vibratile tail, which disappears when they settle, being usually detached by contraction at the base. The sexes are supposed to be distinct in only some of the ascidians. The ovaries are usually large, and the ova are carried away by the stream which passes through the animal. It is in the solitary ascidians that the highest organization is to be observed, and in which a distinction of sexes appears. In them, a muscular ring surrounds the mouth, and can be closed to exclude what is unfit to enter. Within this aperture there is also a fringe of tentacula, short and simple, or longer and minutely divided. In the compound ascidians, gemmation does not begin till the single animal has been fully developed; thereafter, bud after bud is produced, according to the plan upon which the compound system is constructed, and 'the procreative force of the germ-mass finally exhausts itself in the formation of male and female organs, in which that force is again mysteriously renewed under its two forms of the spermatozoon and the germinal vesicle, by the combination of which the reproductive cycle again begins its course.'

Ascidian (young).

The special interest in the A. of late years has been in consequence of the discovery, by a Russian naturalist, Kowalevsky, of what is believed to be a notochord (embryonic backbone), and above it a spinal nervous cord, in the tadpole-shaped larva of an ascidian; but this

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is questioned by some naturalists. See Packard's *Zoology*.

ASCIDIOIDA, n. plu. *ăs-kĭd'ĭ-oy'dă* [Gr. *askidĭon*, a little bag; *eidos*, resemblance]: a class of molluscous animals which have often the shape of a two-necked bottle; same sense as *ascidia;* synonym of 'Tunicata.'

ASCIDIUM, n. *ăs-kĭd'ĭ-ŭm*, ASCID'IA, n. plu.: in *bot.*, a form of leaf in which the stalk is hollowed out and closed by the blade as by a lid; a pitcher-leaf.

ASCII, n. plu. *ăs'ĭ-ī*, or *ăsk'ĭ-ī*, ASCIANS, n. plu. *ăs'ĭ-ănz*, or *ăsk'ĭ-ănz* [L. *ascĭus*, shadowless—from Gr. *askĭŏs*, shadowless, dark—from Gr. *a*, without; *skĭă*, a shadow]: applied to the inhabitants of the torrid zone, who are shadowless at noon. They are also called AMPHIS'CII, because when not shadowless their shadows will at noon fall northwards one part of the year and southwards at another. The inhabitants of the n. temperate zone at noon have their shadows always falling northwards, and those of the s. temperate zone always south, and are called ANTIS'CII, *-sĭ-ī*. In the frigid zones, when the sun is above the horizon, the shadows of the inhabitants are directed to every point of the compass in succession, and they are called PERIS'CII, *-sĭ-ī*.

ASCITÆ, *ăs-sī'tē*, or ASCITANS, *ăs-sī'tănz* [Gr. *askos*, a leathern bottle]: a sect of Montanists who arose in the 2d c. Their name was designed to express the fact that some Bacchanals of their party believed the passage in Matt. ix. 17, which speaks of pouring new wine into new bottles, required them to blow up a skin or bag, and dance around it when inflated, which accordingly they did with suitable vigor, as an act of solemn worship.

ASCITES, n. plu. *ăs-sī'tēz* [Gr. *askos*, a cavity or bladder]: dropsy of the abdomen; a morbid accumulation of serous fluid in the cavity of the peritoneum. ASCITIC, a. *ăs-sĭt'ĭk*, or ASCIT'ICAL, a. *-ĭ-kăl*, dropsical. ASCIT'ICALLY, ad. *-lĭ*. See DROPSY: LIVER, DISEASES OF THE.

ASCITITIOUS, a. *ăs'sĭ-tĭsh'ŭs* [L. *ascis'co*, I receive, I adopt]: additional; supplemental.

ASCLEPIAD, n. *ăs-klē'pĭ-ăd:* a choriambic verse first used by Asclepias, consisting of four feet—viz., a spondee, two choriambi, and an iambus. ASCLEPIADEAN, a. *ăs-klē-pĭ-ăd'ē-ăn*, or ASCLEPIAD'IC, a. *-ĭk*, pertaining or relating to.

ASCLEPIADACEÆ, *ăs-klē'pĭ-ă-dā'sē-ē*, or ASCLEPIA'-DEÆ: nat. ord. of dicotyledonous or exogenous plants, mostly shrubs, often with twining stems, almost always with milky juice. The leaves are entire, and have cilia between their stalks in place of stipules. The flowers are peculiar in their structure, though symmetrical and regular. The calyx is divided into five segments, the corolla into five lobes; there are five stamens, and the stigma has five angles. The filaments are usually united to form a tube, generally furnished with a coronet of peculiar hood-shaped appendages; the anthers are two-celled, the pollen grains

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cohering in wax-like masses, which fall out of the anther cells, and become attached to glands at the angles of the stigma; there are two ovaries and two styles very close together, and often very short, with one dilated stigma common to both. The fruit consists of two follicles, or, by abortion, of one only, having numerous imbricated seeds with thin albumen, the ends of the seeds terminating in long down. There are about one thousand known species, natives chiefly of warm climates. Some of them are cultivated in gardens and hot-houses, upon account of

Vincetoxicum officinale.
a, root; *b*, fruit; *c*, a single seed.

their curious or beautiful flowers, among the most familiar of which are some of the species of *Asclepias* (q.v.) or Swallow-wort; perhaps none of them is more highly esteemed than *Stephanotis floribunda*, the fragrance of which equals its beauty; it is sought for bridal garlands. No hot-house climber is better known than *Hoya carnosa*, at each flower of which a drop of honey hangs. A number of species are medicinal, as Indian Sarsaparilla (q.v.), (*Hæmidesmus Indicus*); Mudar (q.v.), (*Calotropis gigantea*), highly prized in the East Indies; *Sarcostemma glaucum*, the Ipecacuanha of Venezuela; *Tylophora asthmatica* and *Secamone emetica*, the roots of which are used as emetics, and in smaller doses as cathartics, and the former of which is reckoned among the most valuable medicinal plants of India; *Cynanchum acutum*, which yields a purgative called Montpelier Scam-

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mony, and *Vincetoxicum officinale*, which possesses similar properties. Argel (q.v.), much used for adulterating senna, belongs to this order.—The down of the seeds is used sometimes as a substitute for silk or cotton (see ASCLEPIAS); and the stems of not a few species afford useful fibres, as those of the *Asclepias Syriaca* (see ASCLEPIAS), the Mudar (q.v.), and other species of *Calotropis*, natives of India and Persia, *Hoya viridiflora*, *Holostemma Rheedianum*, etc. The Mudar or Yercum fibre is very highly extolled by Dr. Royle (*Fibrous Plants of India*). The bark of *Marsdenia tenacissima*, a small climbing-plant, yields a fibre called *Jetee*, of which the Rajmahal mountaineers make bowstrings, remarkable for their great elasticity, which they are supposed to owe in some measure to the presence of caoutchouc. The fibre of *M. Roylei* is used in Nepal. *Orthanthera viminea*, which grows at the base of the Himalayas, and has long leafless wandlike stems of ten ft. in height, yields a fibre of remarkable length and tenacity, supposed to be peculiarly suited for rope-making. The fibres of *Leptadenia Jaquemontiana* and *Periploca aphyllum* are used in Sinde for making the ropes and bands used in wells, as water does not rot them.—The milky juice of most species of A. is acrid, but in some it is bland, and they are used for food, as is the milk itself of the Kiriaghuna or Cow-plant of Ceylon (*Gymnema lactiferum*). A few species, as *Marsdenia tinctoria*, a native of Silhet, yield indigo of excellent quality. The flowers of the genus *Stapelia* have a strong smell of carrion, and flies sometimes lay their eggs upon them, as it were, by mistake. There are about 20 species in e. and central United States, of which the Butterfly Weed (*A. tuberosa*) is the most brilliant.

ASCLEPI'ADÆ, or ASCLEPIADES: see ÆSCULAPIUS.

ASCLEPIADES, *ăs'kle-pī'ă-dēz:* a Greek physician, b. at Prusa, in Bithynia; lived during the early part of Cicero's life. He has been confounded with several other persons of the same name. He seems to have wandered about considerably before he finally settled at Rome; as we read of his being at Alexandria, Parium on the Propontis, and Athens. It is not known either when he was born or when he died. A. was opposed to the principles of Hippocrates in medicine. Pliny, who professes very little respect for him, reduces his medicinal remedies to five: abstinence from flesh, abstinence from wine under certain circumstances, friction, walking, and 'gestation' or exercise in carrying, by which he proposed to open the pores, and let the corpuscles which caused disease escape in perspiration; for his leading doctrine was, that all disease rose from an inharmonious distribution of the small, formless corpuscles of which the body was composed. He is said to have been very popular with the Romans on account of his pleasant and simple cures. His maxim was, that a physician ought to cure surely, swiftly, and agreeably. A. is also alleged to have been the first who distinguished between acute and chronic diseases, but his knowledge of anatomy was apparently slight. The fragments of his

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writings which remain have been gathered together, corrected, and published by Gumpert, under the title, *Asclepiadis Bithyni Fragmenta* (Weimar, 1798).

ASCLEPIAS, *ăs-klē'pĭ-ăs*, or SWALLOW-WORT: genus of plants, type of the nat. ord. *Asclepiadaceæ*. The corolla is wheel-shaped and reflexed; the coronet fleshy, and each of its hooded tips has a horn. The species are generally upright—seldom climbing and twining—herbaceous plants with opposite, whorled, or alternate leaves. They are mostly American. The flowers are disposed in simple umbels between the leaf-stalks.—*A. Syriaca*, Syrian or Virginian Swallow-wort, sometimes called Virginian Silk, appears to be a native of N. Amer., and not of Syria as was supposed. It is frequently cultivated in flower-gardens. It has an unbranched stem 4–7 ft. high; thick, ovate leaves, covered with a grayish down on the under side, and large, stalked, nodding umbels of many dull red flowers, which diffuse a strong and sweetish odor. The whole plant is full of an acrid white milk, which contains caoutchouc. The young shoots are eaten in N. Amer. like asparagus, as those of *A. stipitacea* are in Arabia. A brown well-tasted sugar is prepared in Canada from the flowers; and the silk-like down of the seeds has been used for the manufacture of textile fabrics, either alone, or with wool or silk, but is more frequently employed for the preparation of wadding, and for stuffing mattresses and pillows. The plant is valuable chiefly for the fibre of its stalks, which is used for the manufacture of thread, cloth, ropes, nets, etc., in many parts of N. Amer., and on account of which it has been recommended for general cultivation in Europe. The fibre is said to be of superior quality. The plant rapidly extends by its creeping roots, and readily becomes a weed, where it has been introduced.—The roots of several other N. Amer. species are used as diaphoretics and expectorants, as *A. incarnata*, *A. tuberosa*, etc. The latter is a very ornamental garden-flower, and is called Butterfly Weed and Pleurisy Root in the United States, where it is frequent on stony and sandy grounds. *A. Curassavica* is called Wild Ipecacuanha in the West Indies, and a decoction of it is used by the negroes as an emetic and purgative.

ASCOLI, *ăs kō-lē* (anciently, *Asculum Picenum*): old city of Italy, cap. of the province Ascoli-Piceno; seat of a bishop; lat. 42° 50′ n., long. 13° 37′ e. It is built on a hill, on the right bank of the Tronto, which formed the boundary between the late Roman and Neapolitan territories. From the Adriatic, it is 16 m. w.; from Ancona, 53 s. Its harbor (Porto d'Ascoli) has some coasting-trade, and is defended by two forts. The town is beautifully situated, commanding a fine view of the fertile valley through which the river flows, and of the rugged Apennines, which here rise 7,212 ft.

In ancient times, it was inhabited by the Piceni, the descendants of a colony of Sabines, who maintained their independence against the Romans until B.C. 268. Nearly two centuries later, they were prominent in the Social

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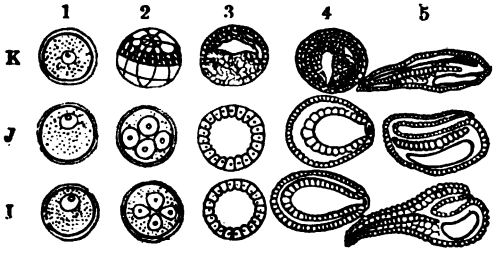
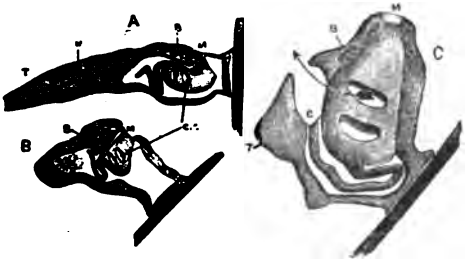
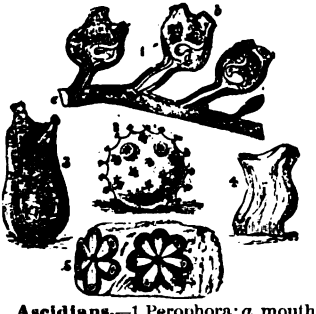


Development of: I, **Ascidian**; J, Amphioxus; K, Frog. 1, ovum; 2, segmenting ovum; 3, morula, or blastosphere; 4, gastrula; 5, further advanced embryo.



Attachment and degeneration of larval **Ascidian**: A, Immediately after attachment to stone or shell; B, showing the degeneration of tail, spinal cord, etc.; C, a young Ascidian which exhibits the symmetry and essential structure of the adult; *b*, brain; *m*, mouth; *n*, notochord; *g*, *s*, gill-slits; *t*, tail.



Ascidians.—1, Perophora: *a*, mouth; *b*, vent; *c*, intestinal canal; *d*, stomach; *e*, common tubular stem; 2, Ascidia echinata; 3, Ascidia virginea; 4, Cynthia quadrangularis; 5, Botryllus violaceus.

Portable **Aspersorium.**

Aspergillus.

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War; and on the taking of their town by Pompeius Strabo, were subjected to the severest punishments. The town was annexed to the papal states by Pope Clement V. 1426; and with them passed to the kingdom of Italy. Pop. (1893) 17,344.

ASCOMYCETES, n. *ăs'kŏm-ĭ-sē'tēz* [Gr. *askos*, a bladder; *mŭkēs*, a mushroom]: in *bot.*, the group of Fungi which reproduce by asci. See ASCUS.

ASCOSPORES, n. plu. *ăs'kŏ-spōrz* [Gr. *askos*, a bladder, and *spores*]: in *bot.*, the spores or reproductive cells developed in asci.

ASCRIBE, v. *ăs-krīb'* [L. *ascrībĕrĕ*, to add to a writing —from *ad*, to; *scrĭbo*, I write—*lit.*, to add to a writing]: to impute to; to assign to as a cause; to attribute. ASCRI'BABLE, a. *-bă-bl*, that may be attributed to. ASCRI'BING, imp. ASCRIBED, pp. *ăs-krībd'*. ASCRIPTION, n. *ăs-krĭp'shŭn*, the act of attributing to. ASCRIPTI'TIOUS, a. *-tĭ'shŭs*, ascribed; imputed; assigned.

ASCUS, n. *ăs'kŭs*, ASCI, plu. *ăs'kī* [Gr. *askos:* L. *ascus*, a bladder]: in *bot.*, large cells, in which new cells or spores, usually eight in number, are developed—a common mode of reproduction in certain cryptogams; called also ASCELLI. ASCIGEROUS, a. *ăs-sĭj'ĕr-ŭs* [L. *gero*, to wear, to carry about]: having asci.

ASELLI, *ā-zel'ē*, ASEL'LIO, or ASEL'LIUS, CASPAR: abt. 1581—abt. 1626; b. Cremona: celebrated Italian physician. He served at first as a military surgeon, afterwards became prof. of anatomy and surgery at Padua. In 1622, while at Milan, he discovered the lacteal vessels. Before A.'s time, anatomists had supposed that the chyle was carried from the intestines into the liver by the mesenteric veins. One day, dissecting a living dog, he noticed for the first time the multitude of little vessels, which suck up the nutritive portion of the food. At first, he took them for nerves; but on pricking one with the point of his scalpel, a white liquid spurted out, and the discovery flashed on him in a moment. He seems, however, never to have understood or described them with complete accuracy. His treatise on his discovery was pub. a year after his death. It is entitled *De Lactibus, sive Lacteis Venis, Quarto Vasorum Mesaraicorum Genere, Novo Invento, Dissertatio*, and has several times been reprinted.

It is remarkable that such men as Gaspard Hoffman and Harvey zealously combated the opinions of A. It was nearly half a century before professional men admitted that a great discovery had been made in anatomy. See LACTEALS.

ASEL'LUS, in Ichthyology: generic name now disused, but by which the cod and other *Gadidæ* were formerly sometimes designated. It is retained in the pharmacopœias, in the name of Cod-liver Oil, *Oleum jecoris aselli.*—The same generic name is now employed, in a different department of natural history, to denote a genus of small Isopod Crustaceans, one of which, *A. aquaticus*, is sometimes called the Water Hog-louse. This genus is the type of a family, *Asellidæ*.

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ASEPSIS: n. *a-sĕp' sis* [Gr. *a*, without; *sepsis*, putrefaction]: in surgery a state of the most rigid cleanliness of the patient, of the surgeon and assistants, of all instruments used in the operation, and of the ligatures, sutures, and dressings. It differs from Antisepsis (see ANTISEPTIC) in that A. aims at exclusion of all germs of disease, while Antisepsis is directed toward their destruction. In order that a surgical operation may be performed aseptically the patient must be bathed, and the portion to be operated on must be scrubbed, shaved, and disinfected by a germicidal agent; the surgeon's and his assistants' hands must in like manner be scrubbed, particular attention being given to the finger.nails, under which germs find a fertile soil. The instruments are rendered sterile and free from germs best by heat, either dry or moist; so baking or boiling is resorted to. The sponges used to absorb blood must be absolutely aseptic, as must also the catgut used for ligatures, and the material for sutures, which may be silver wire, catgut, or silk. By thus precluding all possibility of the entrance of germs, the surgeon may now undertake operations, such as amputations or laparotomics, with every feeling of security, knowing that if his aseptic precautions have been perfect he may reasonably expect the wound to heal by primary union without fever, and without formation of a drop of pus. Since A. has been practiced operations are performed, with perfect recovery of the patient, that previously would have been considered foolhardy and certainly fatal; hospital gangrene is unknown, 'blood poisoning' almost unheard of, and the mortality following operations reduced to a minimum.

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ASEPTA, n. *ă-sĕp'tă* [Gr. *aseptos*, not liable to putrefy]: substances not liable to putrefaction. ASEPTIC, a. not liable to putrefy.

A'SES [singular in Old Norse *As*, pl. *Aesir;* in Gothic, *Ans;* in Saxon. *Os* (*Es*)]: a race of gods in Northern or Scandinavian Mythology (q.v.), though not the oldest, yet the most powerful, like the Jupiter dynasty among the Greeks. They are usually considered as numbering twelve gods, and as many goddesses. The gods are—Odin, Thor, Baldur, Niord, Freyr, Tyr, Bragi, Heimdal, Widar, Wali, Uller, and Forseti; the best known of the goddesses—Frigga, Freyja, Idunna, Eira, and Saga. The worship of the A., or the Odin religion, at least in its outlines, was rooted not only among the nations of Scandinavia, but among the Germanic races generally. Besides other traces, proofs of its prevalence are found in a multitude of Gothic, Saxon, and Old High German proper names; many of which continue in use, though their connection with German paganism passes unperceived: Oswald, Esmond, Oswin, Anselm, Ansgar, etc.

ASEXUAL, a. *ă-sĕks'ū-ăl* [Gr. *a*, without, and *sexual*]: having no distinct sex; applied to modes of reproduction of living creatures, in which the sexes are not concerned.

ASGARD, *ăs'gârd:* in Scandinavian Mythology (q.v.), the home of the gods. Odin and the other gods dwelt in the mansion Gladsheim, the goddesses in Vingulf. Warriors slain in battle lived here in Walhalla. Every day the gods assembled in council beneath the ash-tree Yggdrasil.

ASGILL, *ăs'gĭl*, JOHN: an eccentric English *littérateur;* b. about the middle of the 17th c., d. 1738, Nov. He studied for the bar; but being addicted to writing political pamphlets, he soon became involved in pecuniary difficulties. Upon the passing of the act for the resumption of forfeited estates in Ireland, 1699, he went thither, found the whole country wrangling in lawsuits, secured a lucrative practice, and obtained a seat in the Irish parliament. But he had recently published an extraordinary pamphlet, entitled, *An Argument proving that, according to the Covenant of Eternal Life revealed in the Scriptures, Man may be translated hence into that Eternal Life without passing through Death, although the Human Nature of Christ himself could not thus be translated till he had passed through Death* (1700). The public flew into a rage against this absurd production; the Irish parliament voted it a blasphemous libel, and the astonished author was expelled from the house after four days. In 1705, A. returned to England, and entered the English parliament as member for Bramber, in Sussex. But the fame of his unlucky pamphlet haunted him perpetually: the English house, resolving to be not less virtuous than the Irish one, took up the treatise, condemned it to be burnt by the common hangman, as profane and blasphemous, and expelled A., 1707, Dec. 18. After this, he betook himself for a living to professional practice of a humble grade—still inditing pamphlets,

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ASH, n. *ăsh* [AS. *æsc:* Icel. *askr*]: a well-known tree. ADJ. made of or pertaining to the ash; the *Fraxinus excelsior*, or common ash, ord. *Olĕăcĕæ*. ASHEN, a. *ăsh'ĕn*, made of ash. ASH-KEYS, or ASHEN-KEYS, seed vessels of the ash-tree, called by botanists *samaras*, i.e., dry, indehiscent, winged, two-celled, two-seeded capsules. Their length and lateral compression make the resemblance to keys. The term is used in heraldry, the seed-vessels being occasionally represented on an escutcheon.

ASH (*Fraxinus*): genus of trees belonging to the nat. ord. *Oleaceæ*, and distinguished by very imperfect flowers, in which the calyx is obsolete, and the corolla either want-

Common Ash.

ing or 3–4-partite; the fruit is a *samara*, a seed-vessel foliaceous at the extremity. The leaves are deciduous, and are pinnate with a terminal leaflet. There are about fifty species, natives mostly of Europe and North America.—The COMMON ASH (*F. excelsior*) grows wild in the middle and s. of Europe and n. of Asia. It is an undoubted native of Britain. The flowers are quite naked; the leaves have five or six pairs of leaflets. The flowers appear before the leaves in spring, and the tree is not covered with leaves until the season is far advanced, losing them again early in autumn. It is, however, a most beautiful umbrageous tree, highly ornamental in parks; though extremely injurious to the grass or crops immediately around it. It rises to the height of 100–150 ft., generally with a smooth stem. The wood is white, tough, and hard, much valued by wheelwrights, cartwrights, coach-makers, joiners, and turners. It is also excellent for fuel. Sometimes it becomes irregular in the disposition of its fibres, and finely veined, and is then prized by cabinet-makers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The A. prefers a loamy soil, but grows in almost any, and succeeds in situations too elevated or too exposed for most other trees. Cultiva-

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tion has produced and perpetuated a number of varieties, of which the most remarkable are the *Weeping A.*, with boughs bent almost straight down to the ground; the *Curled-leaved A.*, with dark-green wrinkled or curled leaves; and the *Entire-leaved A.*, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct

Common Ash.

species, and named *F. simplicifolia F. heterophylla* etc.—The SMALL-LEAVED A. (*F. parvifolia*) and the LENTISK A. (*F. lentiscifolia*) are both natives of the shores of the Mediterranean, and are very graceful and ornamental trees.—The AMERICAN A., or WHITE A. (*F. Americana*), is readily distinguished from the Common A. by its lighter bark and paler green leaves. The flowers have a calyx, and the leaflets are shortly stalked and entire (those of the Common A being sessile and serrated). It is abundant in New Brunswick and Canada, but becomes rare to the s. of New Jersey. The trunk often rises more than 40 ft. undivided. The wool is used for the same purposes as that of the Common A.—The RED A., or BLACK A. (*F. pubescens*), is very similar, but of smaller size, and has a deep brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground.—The BLACK A., or WATER A. of the New England States, New Brunswick, etc. (*F. sambucifolia*), is a large tree with buds of a deep blue color.—The BLUE A. of Ohio, Kentucky, Tennessee, etc. (*F. quadrangulata*), is also a large tree. The branches are quadrangular, the young shoots having on the angles four membranes which extend their whole length.—The GREEN A. (*F. juglandifolia* = *viridis*), recognized by the brilliant green of its young shoots, is found

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chiefly in the middle states; and the CAROLINA A. (*F. Caroliniana*), remarkable for the great size of its leaflets, chiefly in the southern states. Besides these, North America produces a number of other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the Common A.—In the s. of Europe grows the MANNA A., or FLOWERING A. (*F. Ornus*, called *Ornus Europæa* by some botanists), whose flowers have a 4-partite calyx, and four small yellowish-white petals. The tree has much re

Common Ash.
a, a branch with leaves; *b*, flowers; *c*, fruit (on a considerably larger scale than the leaves and flowers).

semblance to the Common A. From it the substance called Manna (q.v.) is obtained by means of transverse incisions in the bark; but in very favorable situations, it flows spontaneously during the greatest heat of summer. Manna is chiefly collected in Calabria and Sicily. A nearly allied species, *F. rotundifolia*, a native of Greece and the Ionian Islands, yields it also in perhaps equal quantity. The Common A. is said sometimes to produce the same exudation in the same warm climates.

The MOUNTAIN A. is the Rowan Tree (q.v.), and belongs to a different nat. ord. Its resemblance to the A. is chiefly in its leaves.

The A. has a peculiar importance in Scandinavian mythology. The first man and woman formed were Ask and Embla (Ash and Elm). The court of the gods is represented in the Edda as held under an A., called Yggdrasil (q.v.). Connected, perhaps, with these traditions is the superstitious belief in A. twigs as a charm against witchcraft and magic.

ASHAMED, pp. or a. *ă-shāmd'* [AS. *ascamian:* Meso-Goth. *gaskaman*, to be ashamed: AS. *a*, on; and Eng. *shame*]: confused from a sense of guilt or unworthiness; covered with shame. ASHAM'EDLY, ad. so as to manifest shame; bashfully.

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ASHANTI, or ASHANTEE, *a-shăn'tē:* negro kingdom in w. Africa, n. of Gold Coast Colony; lat. 5°–9°, long. 0°–4° w.; cap. Coomassie (q.v.) or Kumassie. A large part of the country is in forest; and the open land is very fertile, producing maize, millet, rice, yams, tobacco, sugar, cocoa, gums, dye-woods, and pineapples and other fruit. Drainage and limited communication are by the Volta, Prah, and Assinie rivers. Being shut in from the sea-board and having only a caravan route between Coomassie and Cape Coast Castle, A. has but little commerce, its exports being mainly gold-dust and palm-oil. The natives show skill in manufacture of cotton goods, earthenware, and sword-blades, but are still quite savage. It is believed that the establishment of the A. kingdom was made several centuries ago by an emigration from n. of the Kong Mountains. In 1700 Osai Tutu I. conquered Akim, Assin, Gaman, Denkira, and neighboring states, and made Coomassie his capital. During 1807–26 the people were involved in war with Great Britain and were driven from the sea-coast and the territory now forming a part of the Gold Coast Colony. In 1873–4 they were again at war with the English, concerning cession of the Dutch forts to Great Britain; and their capital was burned by Sir Garnet Wolseley 1874, Feb. 6. The king then renounced all claims on the protectorate of the Gold Coast Colony, promised to protect traders, and paid an indemnity to the Brit. govt. In 1876 the Ashantis defeated the Juabins, and the latter took refuge within the Brit. protectorate. Since the burning of Coomassie the Brit. govt. has not attempted to assert territorial rights there, and probably the last white traveller in A. was Freeman, 1888. A. was (1893) the only independent state in the 'hinterland' adjacent to the European possessions on the Gold and Slave Coasts. Pop. estimated, 1,000,000—3,000,000.

ASHBOURNE, or ASHBORNE, or ASHBURN, *ăsh'bŭrn:* market-town in a rich district near the left bank of the river Dove, in the w. of Derbyshire, 13 m. n.w. from Derby. Is lies in a fertile valley, amid beautiful scenery. The parish church is cruciform, dating from the 18th c., restored 1845. There are manufactures of cotton, lace, and iron. At A., 1644, the parliamentary troops defeated those of Charles I. Pop. (1881) 3,485; (1891) 3,810.

ASHBURTON, LORD (ALEXANDER BARING): 1774–1848, May 13: younger son of Sir Francis Baring, Bart. In early life he was for many years commercially engaged in the United States and the Canadas, in the service of the great London mercantile house founded by his father, at whose death, 1810, he became the head of the firm of Baring Brothers & Co. In 1812, he was elected M.P. for Taunton; representing that place, Callington, and Thetford, in the liberal interest, till 1831, and in 1832 was returned for North Essex as a moderate conservative. In the short administration of Sir Robert Peel (1834–35), he was pres. of the board of trade, and master of the mint, and was made Baron A. by patent, 1835, Apr. In 1842, Lord A. was appointed special ambassador to the United States, to settle the n.w. boundary question, and other dis-

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putes threatening war; and in Aug. of that year, he concluded the famous treaty of Washington, commonly called the A. treaty, establishing by definite agreement the frontier line between the state of Maine and Canada. By this treaty seven-twelfths of the disputed ground, and the British settlement of Madawaska, were given to the United States; but it secured a better military frontier to England, and included heights commanding the St. Lawrence, which the award of the king of Holland, who had been chosen arbiter, had assigned to the Americans. By the 8th and 9th articles, provisions were made for putting an end to the African slave-trade; and the 10th article provided for the mutual extradition of suspected criminals. Lord A. opposed free-trade, but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. His eldest son, William Bingham Baring, Lord A., 1799–1864, was educated at Oriel College, Oxford, entered parliament, 1836, as member for Taunton; was appointed sec. to the board of control, 1841, Sep.; and became pay-master-gen. of the forces, and treasurer of the navy, 1845, Feb.

ASHBURTON: small town in the s. of Devonshire, consisting mainly of two paved streets crossing each other. The business is mining, slate quarrying, and serge manufacture. Pop. abt. 3,000.

ASHBY-DE-LA-ZOUCH, *ăsh'bē-dĕl-a-zŏch'*: small town near the source of the Mease, tributary of the Trent, in the n.w. of Leicestershire. Leather-making is the principal manufacture. In the neighborhood are collieries, and saline springs containing common salt in greater proportion than the sea; also ironstone, and fine clay. A canal 30 m. long, without a lock, connects the town with Coventry. The ruins of A. Castle stand on a height s. of the town. Mary Queen of Scots was once confined in this castle. St. Helen's Church, an ancient structure with a tower, is the burying-place of the Hastings family, as well as of Selina, Countess of Huntingdon, the founder of the sect called the Countess of Huntingdon's Connection. Pop. of A. (1891) 4,535.

ASH-COLORED, a. [see ASHES]: colored between brown and gray, like ashes.

ASHDOD: see AZOTUS.

ASHE, *ăsh*, JOHN: patriot: 1720–1781, Oct. 24; b. Grovely, N. C. He served several terms in the colonial assembly, opposed the enforcement of the Stamp Act, and led the force which destroyed Fort Johnson 1775. He was a delegate to the first congress of the province, organized a regt. of troops and paid the expense of its equipment, became brig.gen., made an unsuccessful attempt to take Augusta from the British, and was taken prisoner at Wilmington 1781. His death resulted from small-pox, and from cruel treatment by his captors.

ASHERA, n. *ăsh'ĕr-ă* [Heb.]: the word translated 'grove,' in the Old Test. Scriptures, but it appears to have been only a pole of wood, or a stem of a tree, set upright on a circular altar as an object of worship. See PHALLUS and LINGA.

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ASHES, n. plu. *ăsh'ĕz* [AS. *asca*, or *asce:* Icel. *aska:* Goth. *aezo:* Ger. *asche*, dust, refuse]: the dust or matter that remains from a burnt body; the remains of any body reduced to dust. ASH, sing. a variety of ash, as in cinder-ash, or tobacco-ash; often used for *ashes*, as in *potash*. ASHY, a. *ăsh'ĭ*, pale; like ashes. ASH'ERY, n. *ăsh'ĕr-ĭ*, an ash-pit. ASH'Y-PALE, pale as ashes. ASH-WEDNESDAY, (q.v.), the first day of Lent. ASH-FIRE, the subdued or low fire used in chemical furnaces.

ASHES: remains of animal and vegetable bodies after burning. It is not strictly correct to speak of the A. of a mineral. When lead, for instance, is exposed to heat, it turns to dross, which has the appearance of A., but is merely the lead combined with oxygen. In the same way, volcanic A., as they are called, are only a finer kind of pumice-stone, the solidified scum of molten lava. The A. of organic substances destroyed by fire consist of the fixed salts contained in these substances. In land-plants, the most important are salts of potash, with silica and lime; in sea-plants, soda takes the place of potash. By lixiviation of the A., the potash or soda is dissolved and separated from the insoluble mass, and is then purified by crystallization. The A. of sea-plants contain also more or less iodine. Peat and turf A. contain, besides alkalies, more or less clay and sand; the same is true of pit-coal, which sometimes contains iron.

Formerly A. or the inorganic ingredients of plants were considered unessential to their existence, but chemistry has taught that a certain proportion of mineral food is absolutely necessary to their development.

The A. of animals are similar to those of vegetables. Bone A. consist largely of lime and phosphoric acid, and are a valuable fertilizer. In timbered countries wood A. are an article of considerable trade. They are used in various arts, e.g., soap-boiling, bleaching, dyeing, and glass-making; for manufacture of potash, and for promoting growth of plants (see FERTILIZERS), to which they supply potash, carbonate of lime, phosphoric acid, and a little magnesia. They are useful also in making available for plants stores of nitrogen which the soil contains, or which it supplies only in forms not readily assimilated.

The covering of the head with A. has long been a common sign of mourning among eastern nations, indicative of the very deepest distress. Instances of this are mentioned in Scripture. Penitents in the early Christian Church signified their sorrow and humiliation in like manner, by standing at the door of the church in 'sackcloth and ashes.' See ASH-WEDNESDAY.

ASHEVILLE, *ăsh'vĭl:* cap. of Buncombe co., N. C.; on the East Tennessee Virginia and Georgia and the Western North Carolina railroads; near French Broad river; 125 m. w. of Charlotte, 275 m. w. of Raleigh. There are five churches; three academies and a female college; two daily, two weekly, one semi-monthly, and two

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monthly papers; two national and two state banks (combined cap. $320,000); and several hotels. It is in a large tobacco-growing district, and has four factories in which this product is prepared for market. There are an iron foundry, a planing-mill, and various other industries, as well as important trade with the local district, and quite an export trade in tobacco. The location is pleasant, on the w. side of the Blue Ridge, about 2,500 ft. above sea-level; and the river is crossed by a fine iron bridge. The elevation, fine scenery, and pure air have made A. an attractive health resort. Pop. (1880) 2,616; (1890) 10,235.

ASHFORD, *ăsh'fōrd:* town on the w. of the confluence of the two upper branches of the river Stour, near the middle of Kent. Damask is manufactured here. Pop. (1891) 10,728, which has largely increased from its having become the junction station of three great lines of railway.

ASHLAND, *ăsh land:* town, Schuylkill co., Penn.; in the Mahanoy valley; on the Lehigh Valley and the Philadelphia and Reading railroads; 12 m. from Pottsville. 119 m. n.w. from Philadelphia It has 11 churches: a state hospital for miners; about 20 schools; one daily and three weekly newspapers; a national bank (cap. $60,000); an opera-house; and several hotels. The town is lighted by gas, and electricity, and has waterworks and a public park. There are immense coal mines, large machine-shops, foundries, planing-mills, flour-mills, and manufactures of various kinds. Many of the people are of foreign birth. Pop. (1880) 6,052; (1890) 7,846.

ASH'LAND: city, cap. of Ashland co., Wis.; on Lake Superior, and on the Wisconsin Central, the Chicago St. Paul Minneapolis and Omaha, the Northern Pacific, and the Lake Shore and Western railroads; 80 m. e. of Duluth. It has an excellent harbor, sheltered by the Apostle Islands; is the lake-port for export of all the ore produced in the rich Gogebic range; is connected by steamers with all lake-ports, and by excursion-boats with Washburn and Bayfield; is a favorite summer resort. and has the largest charcoal blast-furnace in the world, 3 of the largest ore docks in the country; 8 lumber wharves; gold and silver smelting-works; 2 opera-houses; 8 saw-mills; street railroad; govt. land office; gas and electric light plants; 3 national banks (cap. $325,000) and 1 savings bank; Vaughn Public Library; 11 churches; 2 daily and 5 weekly newspapers; valuation 1892, $6,605,560; and debt $216,000. Pop. (1885) 4,844; (1890) 9,956.

ASHLAR, or ASHLER, n. *ăsh'lĕr* [OF. *aisseler;* Scot. *aislair*, hewn stone—from F. *aisselle*, the arm-pit, the hollow between a branch and the stem of a tree—from L. *axilla*, the arm-pit: It. *asciare*, to cut or hew with an ax]: rough-hewn stones used for facing walls, as distinguished from rubble or rough stones which are used as they come from the quarry without being dressed; free or common stone roughly dressed with tools to fit on one another in courses without packing. A. is laid usually in regular courses in

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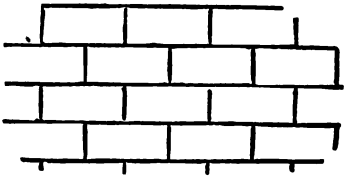
building, and is of various kinds, according to the style of working that side of the stone which is to form the facing



Ashlar.

of the wall. Thus, there are *tooled* A.—the marks of the tooling being either *random* or in *grooves; polished* A., in which the face of the stone is rubbed smooth; and *rustic* A., in which only the joints are accurately hewn, the face of the stone being left projecting irregularly. Quarriers apply the term A. to squared stones before being hewn. ASH'LERING, n. in *carpen.*, the fixing of short upright quarterings between rafters and the floor. In old documents, the term appears under a variety of forms, such as achlere, ashelar, aslure, and estlar. *Note.*—Skeat traces OF. *aisselle*, in the sense of 'a little plank,' to mid. L. *assella*, a dim. of *assis*, a board, houses being formerly erected with a facing of planks, and the name was finally transferred to the facing with rough-hewn stone.

ASHLEY, LORD: see SHAFTESBURY.

ASHMEAD-BARTLETT, WILLIAM LEHMAN; b. New Brunswick, N. J., 1851; son of an Eng. non-conformist minister. He was educated at Oxford Univ. Through his mother's acquaintance with Baroness Burdett-Coutts (q.v.) he became her protegé, and later her private sec. In 1881, Feb. 12, he married the baroness, 37 years his senior, who, by this marriage, surrendered part of her immense fortune. A. was elected to parliament, and re-elected 1886 and '92, sitting for Westminster. By royal license he assumed the name Burdett-Coutts.

ASH'MOLE, ELIAS: 1617, May 23—1692, May 18; b. Lichfield, Eng.; lawyer and author. During the civil wars he was a royalist cap.: at Oxford, he applied himself to the sciences and astrology. In 1652 he issued *Theatrum Chymicum Britannicum*, which procured for him a high reputation, and (1658) *Way to Bliss*, a work on the philosopher's stone. In 1682, he gave the Univ. of Oxford "The Ashmolian Collection" of rarities which had belonged to John Tradescant.

ASH'MUN, JEHUDI: 1714–1828, Aug. 28; b. Champlain. N. Y.: American philanthropist. He was educated for the Christian ministry; but eventually, as editor, author, and agent, became an advocate and helper of the African Colonization Soc. for founding a colony of liberated negroes on the w. coast of Africa. See LIBERIA. He conducted a body of liberated negroes from Baltimore, and landed at Cape Mesurado, the seat of the infant colony, in autumn, 1822. Dr. Ayres and the other agents of the society having meanwhile abandoned the settlement from severe illness, he assumed the superintendence of affairs as the sole representa-

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tive of that body; and for more than six years, he gave himself with great courage, tact, and ability. to establishing the infant colony of Liberia. His health failed; he returned to the United States, and died soon afterwards. A memoir of his life, by R. R. Gurley, appeared at Washington, 1835.

ASHO'CA: see ASOCA.

ASHORE, ad. *ă-shōr'* [AS. *a*, on, and *shore*]: on shore; on the land.

ASHTABULA, *ăsh'ta-bū'lá:* t. in Ohio, in township and county of the same name; on both sides of Ashtabula, river, near its mouth; 54 m. from Cleveland, 3 m. from Lake Erie; on the Ashtabula, Youngstown and Pittsburgh, and the Lake Shore and Michigan Southern railroads. It was laid out, 1837. A. contains three banks (one national), 2 newspaper offices, and 6 churches. Its manufactures comprise a rolling-mill, machine shop, 2 shaft factories, and 2 manufactories of sashes, blinds, and doors. Pop. (1880) 4,445; (1890) 8.316.

ASH'TON-IN-MACKERFIELD: township in a carboniferous district, in the middle of South Lanchashire. Pop. (1881) 9,825, chiefly engaged in collieries, and in the cotton manufacture; (1891) 13,379.

ASH'TON-UNDER-LYNE: town in the s. e. of Lancashire; a great seat of the cotton manufacture. The population is employed also in bleaching, dyeing, and calico-printing, in collieries, and in the manufacture of machines, bricks, etc. A. returns one member to parliament. To the w. is a large moss or shaking bog, containing fir-trees full of turpentine, and black oak, with a loamy bottom at the depth of 10 ft. Pop. (1871) 37,389; (1881) 43,389; (1891) 40,494.

ASHTORETH, n. *ăsh'tō-rĕth* [Gr. *astar'tē:* in Phœnician, the wife of Baal]: a goddess of the ancient Sidonians and Philistines, identified with Venus of the Romans; Astarte. ASH'TAROTH is the plu. form of *Ashtoreth*. See ASTARTE.

ASH-WEDNESDAY: first day of Lent (q.v.), so called from the Rom. Cath. ceremony of strewing ashes on the head as a sign of penitence. This custom, introduced probably by Gregory the Great (590–604), was sanctioned by Pope Celestin III, 1191, and afterwards generally prevailed. Before mass, the ashes were consecrated on the altar, sprinkled with holy water, and signed three times with the cross, while the priest recited the words, *Memento quia pulvis es, et in pulverem reverteris!* ('Remember that thou art dust, and must return to dust!') Next, they were strewed on the heads of the officiating priests, the clergy, and the assembled people. The ashes were said to be those of the palms consecrated on the preceding Palm Sunday (q.v.)—The Protestant Church in Germany does not observe A. In the Church of England, it is observed by the stricter members, but only as a day of penitential service, without anything of the ceremony from which it derives its name; and the *commination*—a series of denunciations against impenitent offenders—is appointed to be read in the service of this day.

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ASIA, *ā'shĭ-a*: largest division of land on the globe, generally regarded as the birthplace of the human race, and the most ancient seat of civilization. Its superficial area, including islands, has been estimated at from 16 to 20,000,000 sq. m., and its population at 840,000,000. This enormous continental mass lies almost entirely in the n. division of the e. hemisphere, while its world of islands extends across the equator on the s.e. On three sides, it is surrounded by the ocean; but on the w., is partially connected with Africa and Europe. The continent is more than four times as large as Europe. Some idea may be formed of its vast extent by the calculation that, though it contains more than half of the whole population of the globe, the number of its inhabitants is so small compared with its area, that Europe may be said to be three times more densely populated. The coast-line is about 33,000 m. in length; and on the s. and e., is diversified by seas, bays, and gulfs, affording advantages to navigation and commerce far superior to those of Africa, but inferior to those possessed by Europe and America. On the w. side, the Dardanelles and the Sea of Marmora may be regarded as but a slight interruption of the great table-lands of Europe and A. which form the continent of the old world.

Horizontal Configuration.—A. is bounded n., by the Arctic Ocean; e., by the Pacific Ocean; s., by the Indian Ocean; and w., by Europe, the Black Sea, Archipelago, Mediterranean, and the Red Sea. On the extreme n.e., the peninsular land of Kamtchatka is separated from North America only by the narrow Behring's Strait. On the s.e., a bridge of numerous islands—Sumatra, Java, Borneo, Papua, etc.—extends towards Australia. The body of the continent may be regarded as a trapezium, of which the offsets, consisting of several large peninsulas, bear some resemblance to those of Europe; though in A. everything is on a more gigantic scale. Thus, one of these offsets, the peninsula of Arabia, is four times as large as France. On the w. extends the peninsula of A. Minor or Anatolia, divided from Europe by the Strait of Constantinople, the Sea of Marmora, and the Dardanelles, with the Black Sea on the n., and the Levant on the s. On the s. of A., the peninsular configuration may be divided into three principal masses, corresponding to the s. coast of Europe; Arabia may be considered as a counterpart to Spain; Italy, with its neighbor-island, Sicily, is represented by Hindustan and Ceylon; and, as in Europe, the broken Grecian peninsula is connected with A. by a bridge of numerous islands extending on the s.e., so in A., the Eastern Peninsula (or India beyond the Ganges), lying between the Bay of Bengal and the Chinese Sea, is connected with Australia on the s.e. by the vast Eastern Archipelago. This world of islands is divided into the several groups of the Philippine Islands, Borneo, Celebes, Molucca Islands, Sumatra, and Java, Timor and the numerous adjoining isles. The e. coast of A. is characterized by the deep indentations of the Pacific Ocean in the Chinese Sea, Yellow Sea, and Sea of Japan, Okhotsk,

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and Kamtchatka; all fringed with numerous islands, and separated by the peninsula of Corea, the island of Saghalien, and the peninsula of Kamtchatka. On the n., the Siberian coasts are also deeply indented; but rather by the embouchures of large rivers than by arms of the sea. The whole length of continental A., from the Dardanelles to the Japan Islands, is 6,000 m.; its breadth, from Malacca to the n.e. cape of Siberia, is 5,300 m.; with its islands it extends from 10° s. lat. to 78° n., and from 26° e. long. to 190° e. or 170° w. Such an extent of surface must include all varieties of soil, climate, and production.

Vertical Configuration.—Equally grand are the features of this continent when regarded vertically: it has the most extensive lowlands, the most immense table-lands, the highest chains of mountains, and the most elevated summits in the world; tracts doomed to everlasting snow or scorching sterility, salubrious valleys of continual verdure, and noisome jungles of the rankest growth. The table-lands of Asia occupy two-fifths of the whole continent. The eastern extremity is 2,000 m. broad; the western, less than 1,000. The whole mass may be regarded as consisting of two parts, separated, or, to speak more properly, perhaps, connected by the lofty, snow-covered mountain-isthmus of the Hindu Kush. These great divisions are styled respectively: 1. The Eastern Plateau, including the Table-land of Tibet and the Desert of Gobi; 2. The Western Plateau, or Table-land of Iran. The former, a vast four-sided mass, considerably larger than the whole area of Europe, extends 2,800 m. from the mountain chain, Hindu Kush, to the Tonquin Gulf in China. On the south, the plateau is divided from the plains of Hindustan by the Himalaya Mountains, which have a mean height of 18,000 ft., while several of their summits rise 25,000–29,000 ft. above the level of the sea. Even the passes over this enormous range of mountains are almost as high as the summit of Mont Blanc. Here Dhwalagiri, long supposed to be the Mont Blanc of the Himalayas, and with precisely the same signification, viz., 'white mountain,' rising to 26,826 ft., leaves all the peaks of the Andes far below; while Kunchinjinga reaches to 28,156 ft., and Mount Everest, now believed to be the loftiest summit in the world, attains the height of 29,002 ft. Cultivation is found at 10,000 ft. above the sea; while flocks graze some 4,000 ft. higher. In Eastern Tatary and Tibet, the ground is cultivated at a height only 2,000 ft. lower than the summit of Mont Blanc. On the e., the table-land of Tibet is bounded by the Chinese mountain-ranges Yun-ling and Khing-khan, which, towards the s., are connected with wild Chinese alpine regions of which little is known; while, towards the n., they extend into another mountainous region, where the eastern chain of Shangpe-shan opposes to the Pacific Ocean a wall of rock 3,000 ft. high. On the north, the chain of the Altaï Mountains, 3,000 m. long, and divided into several groups, forms the boundary between the great plateau and the plain of Siberia, which is larger than the whole of Europe.

The Western Plateau, or Table-land of Iran, rises gener

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ally about 5,000 ft. above the sea; but in some parts to 7,000 ft.; descending, however, to 2,000 and 1,200 ft. in the central and southern parts, where it spreads out into sandy and gravelly plains. It has been divided into three sections: the Plateau of Iran proper; the Median-Armenian Alpine region; and the Anatolian Table-land. The *first* division, or the Plateau of Iran, has a mean altitude of about 3,000 ft. Salt plains, with gravel and sand, form large portions of the surface, and mountain-walls on all sides hem it in. On the n. edge stand the Persian mountains; on the e. are the steep and lofty parallel chains of the Indo-Persian boundary mountains; and on the s., the plateau, for 1,000 m. along the Persian Gulf and Arabian Sea, is bounded by the wild terraced regions of Beloochistan and Farsistan. The *second* division, or the Median-Armenian Alpine region, includes the mountainous regions of Armenia, Kurdistan, and Azerbijan. Here the table-land is compressed to about half its general width. From this plateau, of which a part is mentioned in Scripture as 'the mountains of Ararat,' rises the volcanic cone commonly styled Mount Ararat, to the height of 17,212 ft. above the sea. Anatolia, the *third* and most westerly division of the table-land, is bounded along the shores of the Black Sea by mountains rising to 6,000 or 7.000 ft., and partly covered with forests; on the s.w., the Taurus chain of mountains, beginning in the islands of Rhodes, Cos, etc., extends in several ramifications through a part of Asia Minor, runs in a single range along the coast of Karamania, and in the e. has an occasional height of 12,000 and 13,000 ft.

The Western Plateau, thus divided into three sections, is full of diversities of soil and scenery. A great part of the table-land of Iran (or Persia) is extremely barren and arid, which serves to explain the enthusiastic terms in which the Persian poets have spoken of the beautiful valleys here and there among the mountains. The coasts of the Persian Gulf are sandy wastes. Between Irak and Khorassan, a desert of clay, covered with salt and nitre, varied only by patches of verdure here and there, occupies 27,000 sq. m., and joins the wide sandy desert of Kerman. A great part of Beloochistan is an arid plain, covered with red sand.

Besides these central masses, there are several detached mountain chains and plateaus. The Ural Mountains, forming the land-boundary between Europe and Asia, and separated from the Altaï chain by salt lakes, marshes, and deserts, are divided into three sections: the Northern, Central, and Southern Ural. The second of these divisions is rich in minerals—gold, platina, magnetic iron, and copper. On the isthmus between the Black Sea and the Caspian, the alpine ridges of the Caucasus reach a height of from 10,000 to 11,000 ft., while individual peaks tower 17,000 or 18,000 ft., as, in the still faintly volcanic peak of Elbruz (18,493 ft.) and Kasbeck (16,523)—both, however, on the n. or European side of the main mass of the Caucasus. The high lands of Syria rise gradually from the neighboring deserts to the height of 10,000 ft. in Libanus and Antilibanus, and slope steeply in terraces

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down to the narrow coast-lands of Phœnicia and Palestine. The plateau of the Deccan, in India, rises to an average height of from 1,500 to 2,000 ft., and is divided on the w. from the narrow coast-level of Malabar by the Western Ghauts, 4,700 ft.; on the e., from the broad level coast of Coromandel, by the Eastern Ghauts. On the n., it is divided from the low plains of Hindustan by the Vindhya and Malwah mountain-chains; and, on the s., the Ghauts unite at the sources of the Cavery, and form the Neilgherry (or Blue Mountains, 8,760 ft. high), the loftiest in the peninsular portion of Hindustan. These slope steeply down to a low narrow plain, then rise again to a considerable height in the Aligherry range, sink into the sea at Cape Comorin, and reappear in the group of Adam's Peak in Ceylon. The Malayan Mountains, or chain of the Eastern Peninsula, may be regarded as offsets of the Siue-shan, and extend to the extreme s. point of A., reappearing with volcanic peaks in the Sunda Islands.

The six great *Lowlands* of A. are, 1st, The *Siberian* lowland in the n., by far the largest. It stretches from the n. declivities of the Altaï and Ural Mountains to the shores of the Arctic Sea, and is, for the most part, cold, gloomy, and barren. 2d, The *Bucharian* lowland, or the wild sterile waste between the Caspian Sea and Lake Aral, much of it beneath the level of the sea. It is composed to a large extent of gravelly soil. 3d, The *Syrian and Arabian* lowland, the s. of which is hot and arid, with almost no oases; but the n. is watered by the Tigris and Euphrates. 4th, The lowlands of *Hindustan*, comprising the great Indian desert, 400 m. broad, together with the vast and fertile plains of Bengal, generally called the Valley of the Ganges, and ranking, perhaps, next to China as a region of fertility. 5th, The *Indo-Chinese* lowlands, comprising the long levels of the Burman empire, through which flows the Irrawady, and the rich regions of Cambodia and Siam. 6th, The *Chinese* lowlands, commencing in the e. at Pekin, and extending as far s. as the tropic of Cancer, containing 210,000 sq. m., an area seven times the size of Lombardy. It is watered by a copious river-system and numerous canals, and may be regarded as a vast garden, exceeding in productiveness all other parts of the world.

Hydrography. — The hydrography of A. displays as striking a variety as the structure of its land. The alpine regions send down in some directions torrents of water, which form rivers almost rivalling in magnificence those of America, and which flow for hundreds of miles through plains of unsurpassed fertility. On the other hand, there are wide-stretching tracts, like the deserts of Africa, destitute of water, and doomed to eternal sterility. Only one large sheet of water, Lake Hamoon or Seistan (q.v.), refreshes the high table-land of Iran. The low steppe of Turan contains the Caspian Sea (q.v.), the largest of all lakes, and Lake Aral (q.v.). In the valley of Cashmere lies Lake Ular, 40 m in circumference, and the only considerable sheet of water in the Himalaya chain. At the

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n. base of this mountain-chain, Lake Palte is remarkable for its annular form. In Tibet and the Altaï Mountains, lakes are very numerous.

One of the most striking characteristics of Asian river-systems is found in its double rivers, or two streams rising in the same region, flowing in almost parallel directions, and either uniting, or nearly so, before entering the sea. Among these twin rivers may be mentioned—the Syr-Daria and Amu-Daria, flowing into Lake Aral; the Euphrates and Tigris, in Western A., surrounding the plain of Mesopotamia, uniting at Koona, and together flowing into the Persian Gulf; the Ganges and Brahmaputra; and the Yang-tse-kiang and Hoang-ho, in China, rising near each other, then widely separated in their courses, but again approaching each other, and both falling into the Yellow Sea, only 100 m. apart.

The six great river-systems of A., comprising rivers (see their respective titles), are—the Mesopotamian, that of Northwest India, that of Northeast India and Tibet, the Indo-Chinese, the Chinese, and the Siberian. The *first* comprises the two famous streams, the Tigris and Euphrates. The *second* comprises the Indus with its tributaries. The *third* comprises the Brahmaputra and Ganges. The *fourth* comprises the rivers of the Indo Chinese peninsula; the chief of which are the Irrawady, the Martaban or Saluen, the Me-nam, and the Me-king or Cambodia. The *fifth* system is the Chinese, comprising four great streams, all of which flow in an e. or n. direction into the Pacific; the Hong kiang, or Canton river; the Yang-tse-kiang (or Son of the Sea); the Hoang-ho, or Yellow river; and the Amur. The *sixth* comprises the large rivers of Siberia, the principal of which are the Obi, the Yenisei, and the Lena. They all have their sources in the Altaian Mountains; flow n., or nearly so; and for 800 or 900 m. before their embouchure, traverse a dreary, flat, monotonous waste, until their sluggish waters creep into the Frozen Sea.

Geology.—The geological structure of Asia is so complex, the different formations are so broken up and scattered, that a general description would be unintelligible. For the geological structure and phenomena of circumscribed districts, needful to a correct impression of the geology of Asia as a whole, see the separate titles. See INDIA: CHINA: TIBET, etc.

Natural History.—The vast extent of A., and its great diversities of climate, naturally lead to the expectation of a great variety of natural productions, both animal and vegetable. This expectation is heightened, by considering how completely this vast continent is divided into separate portions by mountain-ranges of great altitude, and how extensive the mountainous tracts themselves are, as well as the great extent of the elevated plateaus or table-lands, and when we add to these considerations that of the peculiar character of wide regions—wastes of sand—level steppes—and extensive districts of which the soil is strongly impregnated with salt. Accordingly, in both the flora and fauna of Asia, an immense variety appears.

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The most northerly part of the continent, however, differs comparatively little in its productions from the corresponding parts of Europe and America. It exhibits the same arctic flora, with differences comparatively inconsiderable. Pines, birches, and willows form, as in the other continents, the last forests of the north; but upon account of the more severe climate, they do not reach a limit so northerly as in Europe, and particularly in the w. of Europe. Some of the common plants of Europe are abundant as far east as Kamtchatka: the Crowberry (*Empetrum nigrum*), so plentiful in the moors of Scotland, is still more plentiful throughout Siberia; the same *Vaccinia* (bilberries, etc.), and *Rubi* (brambles, etc.) abound in the Kamtchatkan forests as in those of Scandinavia. There are, however, interesting differences. Heaths are comparatively rare in Asia, its flora agreeing in this respect with that of America, rather than with that of Europe. The larch, which in Europe occurs only on the central mountains, extends far northward at the mouth of the Obi to the utmost limits of arborescent vegetation; probably a mere variety of the same species, although it has been described as distinct. In Kamtchatka, a different kind of birch replaces the common birch of Europe as a forest tree, and the Siberian stone pine is different from that of the s. of Europe. Siberia in its less frigid regions produces a luxuriant vegetation, of which herbaceous plants of unusually large size for a cold or temperate climate are a characteristic feature; as species of Rhubarb, Angelica, and Cow-parsnip (*Heracleum*), some of which are now well known in Britain. It is indeed from the central and eastern temperate parts of Asia that the cultivated species of rhubarb are derived, and from the same region the rhubarb root, valuable in medicine, is brought. In the abundance of *Grossulariaceæ* (currants), the warmer parts of Siberia resemble North America, though most of the species are different.

To the s. of the Altaian Mountains, the flora of Asia corresponds in part with that of the great eastern plain of Europe; but it exhibits also peculiarities which may in some measure be ascribed to the saline character of large districts, the stony or sandy desolation of others, and the elevation of the great central plateau. The flora of Asia Minor and of Syria has a general resemblance to that of the s. of Europe, although with features also which belong rather to that of India or of Africa. Shrubby *Labiatæ* are particularly characteristic of this region, from which not a few of them have found their way into the gardens of Europe and of other parts of the world, on account of their fragrance, their medicinal qualities, or their use for the grateful seasoning of food.—The tropical flora of Arabia abounds in trees which yield fragrant balsams and resins, particularly of the nat. ord. *Amyridaceæ*. Indeed, both the warmer temperate and the tropical regions of Asia excel other parts of the world in the number and variety of the odoriferous drugs which they produce, with odors of the most various characters, from myrrh and frankincense to asafetida. Arabia has long been noted for the production of coffee,

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now extensively cultivated in other warm parts of A. The date-palm is as characteristic of Arabia as of Egypt. Acacias and mimosas also abound.—The flora of Persia in part resembles that of Arabia, though it is less tropical, and the height of its mountains gives it in some places a very different character.—The abundance of *Scitamineæ* is regarded as particularly characteristic of India; and plants of this order yield ginger, galangal, cardamoms, turmeric, and other articles of commerce, among which not the least important is a kind of arrow-root. Its *Leguminosæ* are also very numerous, both herbaceous and shrubby, or arborescent, many of them exhibiting great beauty of foliage and splendor of flowers; some producing useful kinds of pulse; others timber, gum, medicines, etc The number of valuable medicinal plants which belong to the Indian flora is very great, as is also that of dyewoods; and it abounds in fine fruits, of which the mango and mangosteen may be particularly noticed. *Cucurbitaceæ* (gourds) are very numerous; as are also trees of the genus *Ficus* (fig), some of which produce caoutchouc, and among which are the sacred peepul and the banian-tree, remarkable for the roots which descend from its branches to become new stems, and for the extent of ground which it canopies. Palms are numerous in the tropical parts of A., and particularly in its s.e. regions, but less numerous than in the tropical parts of South America. The cocoa-nut is one of the most common palms in the vicinity of the sea. Some of the Asiatic palms are valuable for the sago which they yield. The nat. ord. *Dipteraceæ* is one of those that are peculiar to India and southeastern A., and includes some of the noblest timber-trees; but the Indian teak, so valuable for shipbuilding, is of the order *Verbenaceæ*. The flora of the Eastern Peninsula, Siam, Cochin-China, and the s.e. of A. generally, differs considerably from that of India, and exhibits, if possible, a richer variety. The change from the Indian flora is still greater in the islands, and a resemblance to that of Polynesia and of Australia begins to appear. The bread-fruit takes the place of its congener, the jack of India. These regions produce nutmegs, cloves, and other spices. The *Lauraceæ* are abundant, yielding cinnamon, cassia, and camphor. Gutta percha has recently been added to the number of the most valuable exports. China and Japan have many plants peculiar to themselves, and are remarkable for the prevalence of the *Ternstrœmiaceæ*, the nat. ord. to which the tea-plant and the camellia belong. It is scarcely necessary to mention how extensively tea is cultivated in China, and how important it is in the commerce of the world. The diversity of climate, however, both in China and Japan, is so considerable, as to imply no small diversity of productions. In like manner, the Himalaya Mountains have a flora very different from that of the Indian plains, and which in some of its most characteristic features, particularly in the prevalence of large rhododendrons and magnolias, has been found remarkably to agree with the flora of the southern part of the United States; while at still greater altitudes there is a strong resemblance to that of

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more northern regions, or of the European Alps; forests of pines appear, and with them the *deodar*, a cedar scarcely, if at all, different from the cedar of Lebanon. The mountains of Java produce oaks and other trees resembling those of the temperate zone, although the species are peculiar. But many parts of A. have as yet been very imperfectly explored.

Many of the cultivated plants of Europe are known to be natives of A., and others are supposed to be so. As the cradle of the human race, and the scene of the earliest civilization, it is natural to suppose that it supplied the first fruits and other vegetable productions which man sought to improve by cultivation; and of some which, as the apple and the cherry, are probably natives of Europe, it seems probable that the first improved varieties were introduced from A. We do not know with certainty of what part of the earth some of the principal cereal plants or grains are natives—as wheat, barley, oats, and rye; but there seems great probability in the supposition that they are of Asiatic origin. Rice certainly is. It has been cultivated from time immemorial in some of the warm parts of A.; and its introduction into other quarters of the world is comparatively recent. Maize—introduced from America—is now to be reckoned among the most important cultivated plants of A., and its cultivation is rapidly extending, as is that of the potato. Wheat, oats, barley, rye, beans, pease, and buckwheat are the principal crops of regions similar in climate to those in which they are cultivated in Europe and America. Barley and buckwheat are cultivated in the Himalayas at the extraordinary elevation of almost 12,000 ft., and crops of barley are to be seen even 15,000 ft. above the sea. Millet of different kinds, durra, and other grains of inferior importance, are cultivated to some extent in India and other warm regions; also different kinds of pulse. The banana and plantain are of the same importance as in other tropical countries; and the yam and cocco or eddoes contribute largely to the supply of human food. The sugar-cane is cultivated in the warm parts of A., but not with so much spirit or success as in America, although it is a native of the East and not of the West Indies. Pepper is one of the native productions of the East Indies, and is extensively cultivated. Tobacco, whether or not any species of it is indigenous to A., is now produced in large quantities. Indigo is extensively cultivated in India, and the opium poppy too extensively. Different species of cotton are natives of India, and have long been cultivated there and in China. Hemp is cultivated in India, not for its fibre, but to afford the means of intoxication; and flax chiefly for the oil of its seeds; but both hemp and flax are extensively cultivated for their fibres in other parts of A.; and India and the other tropical regions produce many plants valuable for their fibres, among which are species of *Musa*, *Corchorus* (yielding the jute of commerce), and *Urtica* (nettle). Among the crops of India is sesamum, valued for the oil of its seeds.

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It seems probable that we are indebted to the warmer temperate parts of A. not only for the orange, the lemon, and all the other species of the genus *Citrus*, but also for the olive, the peach, and nectarine, the apricot, the fig, the mulberry, and the vine, with many other of the fruits now most generally esteemed and cultivated. China and Japan being the seats of an ancient civilization, many useful plants have long been cultivated there, which have scarcely yet found their way into other parts of the world. Floriculture has been practiced there with great assiduity from a remote antiquity; and varieties of Hydrangea, Camellia, Tree Peony, Chrysanthemum, etc., have from time immemorial been scarcely, if at all, less numerous than those of the Tulip and Hyacinth in Holland.

The zoology of A. is not less interesting than its botany. Among domestic animals, the most important are the ox and buffalo, the sheep, the goat, the horse, the ass, the camel, and the elephant. A number of species of ox and buffalo are natives of A., from more than one of which the domesticated races appear to have derived their origin. Very distinct from all the others is the yak (q.v.) of Tibet, a creature which is of great use to the inhabitants of the elevated regions of the Himalayas, and is to them almost what the reindeer is to the Laplander. The sheep and goat are natives of the mountainous parts of Central A. The horse and the ass seem to belong to the same regions; and all of these have been domesticated from the earliest times. The camel is of incalculable value as a beast of burden in the regions of heat and drought, and as affording the means of traversing the great deserts. It is used principally in the s.w. of A. and in India. The elephant is a native of the tropical parts of A., but is of a different species from that of Africa. The reindeer constitutes the chief wealth of some of the tribes of the north. Dogs are also used by some of the Siberian tribes for drawing their sledges. Different races of dogs are domesticated in different parts of A., and a small kind is fattened for its flesh in China; but in the Mohammedan parts of A., the dog is reckoned an unclean animal, and is known chiefly as a prowler about towns and villages, and a devourer of offal.

The tropical parts of A. abound in monkeys, of which the species are very numerous. Among them are some with long and some with short tails, but none with prehensile tails, like the sapajous of America. Many are altogether tailless, and among these is the orang-outang, found in the s.e. islands. A much larger ape, called the pongo, has been said to exist in Borneo, but it is still a doubtful species. The same warm regions abound in bats, many of which are of large size, and feed upon fruits, not upon insects. The flying lemur or colugo is another remarkable animal of the Indian Archipelago.—Bears are found in all parts of A.—the white bear in the extreme north, and other formidable species in the more temperate parts; while the tropical regions produce bears which are not ferocious, and feed chiefly on insects, fruits, and honey.

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Badgers also are found in A., and quadrupeds of several other plantigrade genera, allied to the bear, but of comparatively small size and inoffensive habits, as the beautiful Panda (*Ailurus*) of the n. of India, and the Binturongs (*Ictides*) of Malacca and the neighboring archipelago.—Animals of the Weasel family (*Mustelidæ*) are numerous, among which the Teledu (*Mydaus meliceps*) of Java rivals the skunks of America in the horrible stench with which it surrounds itself for defense. More important are the sable and the sea-otter, pursued in the n. regions upon account of their furs.—Of the Dog family, or *Canidæ*, A. has not only wild dogs, but also wolves, foxes, hyenas, and jackals; the two former abounding chiefly in the colder, the two latter in the warmer regions. The arctic fox inhabits the most northerly shores and islands. The warmer parts of A. produce a number of species of the allied family of the *Viverridæ*, among which are the mangouste or Indian ichneumon—famous, like the Egyptian ichneumon, for the destruction of serpents—and the civet, from which is obtained a celebrated perfume.—Of feline animals, the most dreadful are the lion and tiger; the latter of which is peculiar to A., abounding in the warm regions of the s. and e., never extending westward beyond the mountains and deserts which separate India from Persia; but advancing far to the n., beyond the limits to which the lion advances, and even to the confines of Siberia. The leopard, the ounce, and many other cats, some of them large and dangerous, are found in A., especially in the warmer parts. Among them is the chetah, or hunting-leopard, tamed for the chase in India.—A few small marsupial (or pouched) quadrupeds (*Phalangers*) are found in the Moluccas, and form one of the links by which the natural history of A. is connected with that of Australia.—The *Glires* or *Rodentia*, on the contrary, are numerous in all parts of A., and many species are peculiar to it. Squirrels, marmots, rats, mice, hares, etc., are common in all except the most northerly regions. The brown rat, now so common in Europe, is said to have emigrated from Persia as recently as the beginning of the 18th c. Lemmings abound in Siberia and the Tatarian deserts, of which the jerboa is also an inhabitant. Porcupines are frequent in the warmer parts of A., and the beaver is found in the north.—Of edentate quadrupeds, the Pangolins (*Manis*) alone are Asiatic, and these are confined to the tropical regions.—Of *Pachydermata*, there are, besides the elephant, the horse, etc., already mentioned, several species of rhinoceros, wild boars, the babyroussa, and a species of tapir; all except the wild boar, natives of the warmest climates. One of the most interesting facts, however, connected with the natural history of A. is the abundance of remains of the mammoth, or fossil elephant, in the coldest parts of Siberia, its tusks still affording a considerable supply of ivory. Of ruminating animals, besides those of the ox-kind, already mentioned, and the sheep and goat, there are deer, antelopes, and musks or musk-deer. The reindeer and elk

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are natives of Siberia; further s. the species of deer are much more numerous, and the same countries produce many species of antelope. The musks are found in the central and southern parts of the continent; one of them, a native of the highest mountains, yielding the much prized perfume from which it derives its name.—A. has vultures, eagles, and other *Falconidæ*, owls, ravens, and other birds of the crow kind, herons, storks, cranes, etc, Swans, geese, ducks of various species, and many other *Anatidæ*, frequent its waters, some of them abounding even in the oldest regions. Albatrosses are very numerous on the Kamtchatkan shores; flamingoes on those of the more s. countries. Pigeons abound, and among them is the turtle-dove. The gouras of the Indian Archipelago are birds of the pigeon family, of which one species is almost as large as a turkey. There are many kinds of thrush, finch, warbler, bunting, sparrow, and other birds identical with or allied to those of Europe, among which is the nightingale, often mentioned by the Persian poets, and many, also, that are peculiar and characteristic, particularly in the warmer regions. Of these may be mentioned the splendid birds of paradise of the s.e. islands, peacocks, pheasants, etc. The gallinaceous birds of Asia are numerous, and from this continent was probably derived the domestic poultry of other parts of the earth. The abundance of the parrot tribe is a point of resemblance between the tropical parts of Asia and other tropical countries, but lories are peculiar to the East Indies. The ostrich inhabits the deserts of Arabia as well as of Africa. The cassowary is found in the s.e. islands. The edible swallows' nests of the East Indian coasts have long been celebrated.—Lizards and other saurian reptiles are very abundant in the warmer parts of Asia; and great crocodiles and gavials infest the rivers of the East Indies. Boas, pythons, and other great serpents are found in the tropical regions, which produce also many venomous serpents. The cobra da capello is one of the most dreaded. But the temperate parts of Asia also have venomous serpents, scarcely less dangerous. Some of the East Indian tortoises are remarkable for their great size, and turtles are found in the seas.—Both the salt and fresh waters of Asia produce many kinds of fish. The *Salmonidæ* of the rivers of Siberia supply an important part of the food of its inhabitants. The goldfish, now well known in Britain, is a native of China. Some of the fish of the tropical parts of Asia have attracted attention from the peculiarity of their form or habits. Insect life is exceedingly abundant in the warm parts of Asia, as in all other warm countries. Bees are numerous, and honey is produced in great quantities. Of other insects, it seems only necessary here to mention the silk-worm, introduced from Asia into Europe; and the locust, which sometimes devastates great tracts of the Asiatic countries bordering on the Mediterranean and the Black Sea, and occasionally extends its ravages into regions further west. Of molluscous animals, the pearl-oyster de-

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serves particular notice, upon account of the important pearl-fisheries in different places.

Ethnography.—The whole population, consisting of 840,000,000 people, may be divided into the Mongolian, Aryan, and Semitic groups. The *first* of these includes all the peoples and tribes in the e., n., and s.e., of Asia; the *second* (see ARYAN) comprises the inhabitants of Northern India, Afghanistan, Persia, and part of Asiatic Turkey; the *third* includes the Syrian, Hebrew, and Arabian races. See ETHNOLOGY.

A further subdivision and classification may be made as follows: 1. The *East-Asian group*, including the peoples of Tibet, China, Japan, Corea, and the Indo-Chinese peninsula; all alike in the use of monosyllabic languages. This last people, however, must be subdivided into Western and Eastern, the former comprising the inhabitants of the Burman empire, Pegu, Laos, and Siam, having affinities with the Hindus; and the latter comprising the inhabitants of Tonquin, Cochin-China, and Cambodia, having affinities with the Mongolians of Tibet and China. 2. The *Tatar group*, including the Turkomans, Mongols, and Tungusians, who are spread over the whole table-land of Central Asia and the neighboring lands in the north. The Turkoman family is divided into three sections—the first including the east Turkomans, inhabiting Tashkend, Khiva, Balkh, and Usbekistan; the second including the so-called Tatars of the Urals and the neighborhood of Astrakhan and Kazan; the third including the Turks or Osmanli. With the exception of a few small tribes in Siberia, all the Turkish varieties are Mohammedans, use the Arabic alphabet, and employ numerous Arabic words in their dialects. 3. The *Siberian group*, including the Samoiedes, people of Kamtchatka, etc., speaking languages which have only recently been studied by philologists. 4. The *Malay-Polynesian group*, mixed with Australasian negritos, are spread over all the islands of Polynesia and the Indian Archipelago. The Malayan people of Java, Sumatra, Celebes, the peninsula of Malacca, the Sunda Islands, Moluccas, and Philippines, have an incipient literature, formed under Moslem and (since the 16th c.) under European influence. The South Sea islanders are clearly divided into two races by physical form, color, and language. One race is allied to the Australasian negrito, and the other to the Malayan. In most of the islands, there is a partial intermixture of the two races, but generally the distinction is obvious. It is probable that all the copper-colored Polynesians belong to the same family with the people of the Indian Archipelago. 5. The *Deccan group*, including all the people employing the Tamul, Carnatic, Telugu, and Singalese languages, all having a certain measure of civilization and a literature. 6. The *Indo-Germanic or Aryan group*, marked and subdivided by the three languages, Sanskrit, Persian, and Armenian. About thirty distinct nations, each having a peculiar dialect and literature, belong to the first subdivision; the second

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includes the peoples of Beloochistan, Afghanistan, Persia, and Kurdistan; the third, the Armenians. All these families have literatures partly written in dead languages—the Sanskrit, Pali, Zend, and old Armenian. 7. The heterogeneous tribes inhabiting the Caucasus, whose affinities are not yet settled. 8. The *Semitic group*, including all the peoples whose languages are related to the Hebrew and Arabic.

Religions.—The same Asian characteristic of variety and wide contrast is found in the creeds as in the countries and tribes of people; the Brahminical religion of India; the doctrines of Buddha, Confucius, and of Lao-tse in China; the worship of the Grand Lama in Tibet; the creed of Islam in several varieties in Arabia, Persia, and India; the rude heathenism of the north; the various sects of native Christians in Armenia, Syria, Kurdistan, and India; the Greek Church in Siberia; these and other forms of religious profession show diversities and contrasts nearly as striking as those of Asian geography. Christianity, now the religion of Europe and America, owes its origin to Asia. For the existing religious systems of Asia, see MOHAMMEDANISM: INDIA (*Religion*): BUDDHISM: LAMAISM: etc.

Civilization.—The number of people civilized—in the Asiatic sense of the word—is far greater than that of wild and nomadic hordes; but culture here, when arrived at a certain point, assumes a stationary character, widely differing from the restless intellectual activity and industrial progress of Europe. The laws of states, families, industry, commerce, art, and science are in India and China so many branches of one fixed and permanent religious system, which has maintained its sway through many centuries, and would long remain unchanged, if left undisturbed by European influence. The Arabs, Persians, and Turks, collectively known as the Easterns, are distinct in civilization from the Hindus and Chinese. The institution of slavery among the former, of *caste* among the Hindus, and the civil and political equality of China, are distinguishing marks. The Turk is a monotheist and fatalist; the Hindu is either a mystical pantheist or polytheist, acknowledging a multitude of gods; the Chinese is rather a utilitarian moralist.

Industry.—The industry and commerce of the Asiatic continent bear no adequate proportion to its capabilities: see the titles of the different countries.

Political Aspect.—The political institutions of A present some striking contrasts. While the barbarous hordes in the n. live almost without the idea of government, and scarcely know that the Russian czar claims them as his subjects; and the nomadic tribes, under their khans or sheiks, have a sort of patriarchal government, subordinate to higher powers; monarchy and despotism have existed in their extreme forms among the more cultivated nations. The government of China is an absolute monarchy in form, but, in fact, is strictly limited by the force of tra-

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dition. The emperor is apparently unlimited in authority; but it is an essential duty of an emperor to rule exactly according to the precepts handed down by his ancestors. Reverence for ancestors and their institutions is, therefore, the sole presiding and conservative principle which has so long preserved the great Chinese empire from political changes. A., now so passive, anciently was active in the great movements of the world's history; contended against Egypt and Greece, and afterwards contributed to the greatness and glory of the Macedonian and Roman empires. From the n. of the Caspian Sea, came the vast hordes of the Huns who spread themselves abroad over Europe. The armies of Genghis Khan and Tamerlane overran the Slavonian plains, while the Arab caliphs, with their fanatical troops, established their religion and government in three-quarters of the world. Under the Osmanli fell the eastern Roman empire, and still the Turk maintains a political position in Europe, though a position now becoming very feeble and insecure. In proportion as Europe has advanced, A. has declined in political power, so as to countenance the theory of a gradual movement of the spirit of civilization and progress from the eastern to the western world. As soon as the Asiatic nations have reached a certain moderate pitch of culture, the history of civilization ceases so far as they are concerned, and is followed by the mere chronology of states or dynasties. It appears that all great future changes in the destinies of the peoples of Asia must proceed from European impulses. When Portuguese ships had rounded the Cape and so reached India, a new era of Asian history began. The Portuguese, the Spaniards, Dutch, French, Danes, and English planted their standards on Indian soil. The English speedily extended their dominion here, and soon overshadowed all the other European powers; though the Portuguese and French still maintain their footing in Hindustan, and the French, the Spaniards, and the Dutch own large territories in Further India or the Indian Archipelago. Lately England has increased her influence in the extreme w. of Asia; having secured the occupation of Cyprus, while guaranteeing the defense of the Asiatic dominions of the Porte. Meanwhile Russia has extended her sway over Siberia, Caucasia, and Turkestan; securing thus the keys of China and the approaches to Persia. Even in some of the nominally independent powers, European influence is very powerful; the throne of Persia, for example, is surrounded by European diplomatists. And while Russia and Britain are striving to share between them supremacy in Asia, the French and the Ameri cans have a large share of the commerce of the eastern coasts.

The following table gives an approximate estimate of the area and population of A., according to the more important existing political divisions:

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ASIA.

	Sq. m.	Population.
Russian Asia—		
Caucasus	182,457	7,536,828
Kirghiz Steppe	755,798	2,000,970
Turkestan	409,414	3,341,913
Caspian Sea, etc	383,618	301,476
Siberia	4,833,496	4,538,561
	6,564,768	17,719,748
Western Asia—		
Asiatic Turkey	687,640	21,608,055
Samos (trib. to Turkey)	232	48,500
Cyprus (Brit.)	3,580	209,286
Independent Arabia	968,200	4,000,000
Aden and Perim	80	41,910
	1,659,732	25,907,751
Iran and Turan—		
Persia	628,000	7,653,600
Afghanistan	240,000	4,000,000
Kafiristan	20,000	1,000,000
Beloochistan	106,800	375,000
Khiva	22,300	700,000
Bokhara and Karategin	92,000	2,500,000
	1,109,100	16,228,600
India—		
British Territory	964,992	221,172,952
" Feudatory States	595,167	66,050,479
Ceylon	25,364	3,008,230
French Possessions	196	283,053
Portuguese Possessions	1,447	494,836
Himalaya States (Brit.)	89,600	3,500,000
	1,676,766	294,509,550
Indo-Chinese Peninsula—		
Wild Tribes of Assam (Brit.)	18 675	461,420
Lower Burmah (Brit.)	87,220	4,569,680
Upper Burmah (Brit.)	68,922	2,984,730
Straits Settlements (Brit.)	1,450	506,577
Siam	250,000	6,000,000
Malacca States	31,500	300,000
Cochin China (Fr.)	23,000	1,916,429
Tonkin (Fr.)	34,700	12,000,000
Cambodia (Fr.)	32,390	1,500,000
Anam (Fr.)	106,250	5,000,000
	644,107	35,238,836
China and Japan—		
China proper and Manchuria	1,699,151	393,500,000
Vassal States (Mongolia, Tibet, Zungaria, E. Turkestan, Corea)	2,881,560	9,430,000
Hong-Kong (Brit.)	32	221,441
Macao (Port.)	5	67,030
Japan	147,655	40,072,020
	4,728,403	443,290,491
Southeastern Asia—		
Dutch E. Indies	719,674	29,765,031
Philippines, Marianes, Carolines, Sulu Archipelago (Sp.)	116,256	7,121,172
E. Timor, etc (Port.)	6,290	300,000
N. Borneo and Labuan (Brit.)	31,110	180,000
Borneo States (Sarawah and Brunei)	48,000	400,000
	921,330	37,766,203
Total, Asia	17,304,206	870,661,188

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ASIA, CENTRAL: term usually applied in its geographical sense to the region between the Altai Mountains and the Persian Gulf, including part of Siberia, all Turkestan, Afghanistan, Beloochistan, and part of Persia. An earlier usage—that of Humboldt—gave this name to the khanates of Bokhara and Independent Tartary. In Russian official language, Central Asia is an administrative division of the empire lying to the s.w. of Siberia, and comprising, with part of what used to be called Siberia, the recent Russian annexations in Turkestan. Russian Central Asia is divided into the governments of Akmollinsk, Semipalatinsk, Turgai, Uraisk, Semiretchensk, Syr-Daria, Sarefchan, Kuldja, Amu-Daria, the Trans-Caspian territory, and Ferghana. The total area is stated at 1,227,000 sq. m.; pop. 4,490,000.

A'SIA MI'NOR: ancient name of what is now called Anatolia (q. v.). Here, in Ionia, was the early seat of Grecian civilization, and here were the countries of Phrygia, Lycia, Caria, Paphlagonia, Bithynia, Lydia, Pamphylia, Isauria, Cilicia, Galatia, Cappadocia, etc., with Troy, Ephesus, Smyrna, and many other great and famous cities. Here, from the obscure era of Semiramis (about B.C. 2000), to the time of Osman (about A.D. 1300), the greatest conquerors of the world contended for supremacy; and here took place the wars of the Medes and Persians with the Scythians; of the Greeks with the Persians; of the Romans with Mithridates and the Parthians; of the Arabs, Seljuks, Mongols, and Osmanlis with the weak Byzantine empire.

ASIAN, a. *ā'shĭ-ăn*, or ASIATIC, a. *ā'shĭ-ăt'ĭk:* of or pertaining to Asia. ASIATIC, n. an inhabitant of Asia. ASIATICISM, n. *ā'shĭ-ăt'ĭ-sĭzm*, imitation of oriental manners.

ASIARCH, n. *ā'shĭ-ârk* [Gr. *asiarchēs*]: under the Romans, the director-general of religious ceremonies in the province of Asia. The expression occurs in Acts xix. 31, "And certain also of the Asiarchs." Properly speaking, there was but one A. residing at Ephesus, the others referred to being his subordinates.

ASIDE, ad. *ă-sīd'* [AS. *a*, on, and *side*]: to one side; apart from the rest; at a little distance from the straight line: N. in a *drama*, a speech made by one actor and supposed not to be heard by the rest. TO SET ASIDE, to annul the effect of, as a verdict or judgment of a court of law; to place away for a future occasion or purpose.

ASILIDÆ, n. *ă-sĭl'ĭ-dē:* family of *Diptera*, generally called Hornet-flies. They are fierce and voracious, usually feeding on insects which they catch on the wing. In flying, they make a humming noise; at rest, sit on top of plants. All are harmless to man. ASILUS, genus.

ASINALUNGA, *â-sē'nâ-lŏn'gâ*, or SINA LONGA: town of Tuscany, 22 m. s.e. of Siena. Pop. 1,500.

ASININE, a. *ăs'ĭ-nīn:* see under ASS.

ASIPHONATE, a. *ă-sĭf'ŏ-nāt* [Gr. *a*, without; *siphōn*, a siphon]: not possessing a respiration tube or siphon; applied to a division of the lamellibranchiate mollusks.

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ASITIA, n. *a-sĭsh'ĭ-ă* [Gr.—from *a.* without; *sitos*, wheat food]: in *med.*, loss of appetite, loathing of food.

ASK, v. *ăsk* [AS. *acsian:* Ger. *heischen*, to inquire, to demand: Dut. *eischen:* Icel. *æskia*, to demand, to require]: to beg; to solicit; to seek from; to question; to inquire. ASK'ING, imp. ASKED, pp. *ăskt.* ASK'ER, n. one who.—SYN. of 'ask': to request; beg; beseech; supplicate; entreat; implore; solicit; crave; adjure; interrogate; seek; petition; require; demand; claim; inquire.

ASKANCE, ad. *ăs-kăns'* [It. *schiancio*, athwart, across; *scansare*, to turn aside: Dut. *schuin*, aslant: OF; *a scanche*, obliquely]: sideways; looking towards one corner of the eye. ASKANT, ad. *ăs-kănt'*, obliquely; on one side.

ASKEW, ad. *ăs-kū'* [Icel. *skeifr:* Ger. *schief*, oblique, wry: Icel. *á ská*, askew: L. *scævus*, on the left hand]: awry; obliquely; aside.

AS'KEW, or AS'COUGH, ANNE: d. 1546, July 18: one of the sufferers for Protestant opinions at the dawn of the Reformation in England. Having embraced the views of the reformers, she was turned out of doors by her husband, a gentleman of Lincolnshire, a zealous Rom. Cath. On this she went up to London to sue for a separation; but was eventually arrested on a charge of heresy, and was examined by the Bishop of London and others on the doctrine of transubstantiation, the truth of which she denied. After further examination and torture by the rack, she was burned at the stake, in Smithfield.

ASLANI, n. *as-lā'nĭ* [Turk. and Tart. *aslan*, *arslan*, a lion]: old Turkish coin worth from 115 to 120 aspers (q.v.). The name is sometimes applied to the Dutch dollar in the Levant.

ASLANT, ad. *ă-slănt'* [AS. *a*, on, and *slant:* Scot. *asklent*, askew: OF. *esclincher*, to slip]: not at a right angle; on one side; leaning towards.

ASLEEP, ad. *ă-slēp'* [AS. *a*, on, and *sleep*]: in a state of sleep; at rest.

ASLOPE, ad. *ă-slōp'* [AS. *a*, on, and *slope*]: in a sloping manner.

ASMANNSHAUSEN, *ăs'mănz-how'zĕn:* village in the jurisdiction of Rüdesheim, Nassau; famed for the wine produced on the slate-mountains in its vicinity. Of this there are two kinds, red and white, the former greatly preferred. It has a rich red color, like Burgundy; possesses a rare aromatic flavor; and is noted for its uncommon strength and fire. But it retains its excellent qualities only about three or four years; after which, year by year, it becomes weaker, and loses its color. The choicest sort, preferred by connoisseurs to all the other red wines of the Rhine, and even to Burgundy itself, is cultivated in the ducal vineyards at Wiesbaden.

ASMATOGRAPHY, n. *ăs-mă-tŏg'ră-fĭ* [Gr. *asma*, a song; *graphē*, a writing]: a writing or treatise on songs.

ASMODEUS, *ăz-mo-dē'ŭs* (properly, ASCHMEDAI, 'the

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destroyer'): an evil genius or demon mentioned in the later Jewish writings. A. was described as the author of many evils. In the book of Tobit (q.v.), he is represented as slaying the seven husbands of Sara, and hence, in modern times, has been jocularly spoken of as the destroying demon of matrimonial happiness. In the Talmud, A. is described as the prince of demons, and is said to have driven Solomon from his kingdom.

ASMONEAN, or ASMONÆAN, a. *ăs'mō-nē'ăn:* pertaining to the Asmoneans, a family that reigned over the Jews 126 years, till B.C. 39. See MACCABEES.

ASO'CA (*Jonesia Asoca*): Indian tree of the nat. ord. *Leguminosæ*, sub order *Cœsalpineæ;* remarkable for the beauty of its red and orange flowers. The leaves are abruptly pinnate, shining, and very beautiful. The A. is often mentioned in Indian poetry, and is connected also in various ways with the Hindu mythology.

ASO'KA, or ASHO'KA, or DHAR-MA-SO'KA: an Indian king, who lived B.C. 3d c.; called the 'Buddhist Constantine,' having organized Buddhism as the state religion. As king of Magadha or Behar, A. became a zealous convert to Buddhism abt. B.C. 257, and in 244 he convened the third of the great Buddhist councils at Patna. Throughout his kingdom and the conquered provinces he published the grand principles of the system; and the edicts by which these sermons were preached are still found graven deep on pillars, caves, and rocks from Peshawar and Kathiawar to Orissa. About 40 such rock inscriptions are still extant; but he is said to have erected 84,000 memorial columns. His civil organization and administration of justice were admirable.

ASOLA, *ä-sō'lä:* town of Italy, province of Brescia; 19 m. w.n.w. of Mantua. Pop. 1,000.

ASOMATOUS, a. *ă-sŏm'ă-tŭs* [Gr. *a*, without; *sōmă*, a body; *sōm'ata*, bodies]: without a material body.

ASONANT, a. *ăs'ō nănt* [Gr. *a*, without: L. *sonan'tem*, sounding]: without sound; not resonant.

ASOPIA, *ă-sō'pĭ-ă* [Gr. *Asōpos*, god of the river *Asopus* in Achaia]: genus of moths of the family *Pyralidæ*. *A. farinalis* is the so-called Meal-moth.

ASP, n. *ăsp*, or ASPIC, n. *ăs'pĭk* [OF. *aspe:* F. *aspic*, a kind of viper—from L. *aspis*, or *aspĭdem*, a venomous serpent]: a small serpent whose bite is fatal, the name of which has come down from ancient times; the vague descriptions of ancient authors, however, causing uncertainty as to the species. It is very generally supposed to be the *Naja Haje*, the El Haje or Haje Nasher of the Arabs, which is very common in Egypt, Cyprus, etc., and often appears in hieroglyphic and other sculptures as one of the sacred animals of ancient Egypt. It is sometimes from 3 to 5 ft. in length, of nearly equal thickness throughout, with a gradually tapering tail; brownish, varied with dark and pale spots; the scales of the neck, back, and upper surface of the tail slightly carinated; the tail about one-fourth of

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the whole length of the animal. The neck is capable of considerable dilatation, through the distension of its loose skin, although not so much as that of the nearly allied cobra da capello of India (*Naja tripudians*). The dilatation of the neck takes place when the serpent is irritated. The jugglers of Egypt are accustomed to perform tricks with this serpent, as those of India with the cobra da capello, causing it to dance to their music; after they have first, however, carefully extracted the poison-fangs. It is very venomous. Several varieties exist at the Cape of Good Hope, one of which is nearly white; and one is called Spuugh Slang, or Spitting Snake, by the colonists, from its supposed power of ejecting its poison to a distance when irritated; the poison which distils from the fangs in such

Naja Haje.

circumstances being probably carried off by the forcible expirations which the creature makes—a characteristic, however, not exclusively belonging to a particular variety.—Other serpents of the same family, *Viperidæ*, are by some believed to be the true asp, particularly *Vipera Echis* and *V. Cerustes*. The former is a grayish or yellowish brown color, with rays and eye-like spots on the upper parts; it is found both in India and the n. of Africa. The latter is of a grayish color, and has a very broad heart-shaped head, a short, obtuse, rounded muzzle, and the superciliary or eye-brow scales remarkably developed, so that one of them is often produced into a sort of spine; it inhabits the deserts of n. Africa.—The name asp is now generally given to *Vipera Aspis*, a native of the Alps, found also in the s.e. of Europe and in Sicily, which much resembles the common

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viper, but is more slender, and has a larger head; it is also more venomous.

ASP, n.: see ASPEN.

ASPALATHUS, *ăs-păl'ă-thŭs* [Gr. *aspalathos*, a thorny shrub whose bark and roots yielded a fragrant oil—named from the island *Aspalathus*, where it grew; it has not been certainly identified]: ancient unidentified shrub; also a plant called the Rose of Jerusalem, or Our Lady's Rose; in modern *bot.*, a genus of plants belonging to the order *Leguminosæ*, sub-order *Papilionaceæ*. It contains about 150 shrubs and under-shrubs,

ASPALAX, *ăs'pa-lăx* [Gr. *aspalax*, or *spalax*, a mole]: genus of *Rodentia* to which belongs the *A. typhlus* of Turkey, s. Russia, and Persia. It has no real affinity to our mole, which belongs to *Insectivora*.

ASPARAGIN, *ăs-păr'ă-jĭn*, $C_4H_8N_2O_3$: a crystalline substance which exists ready formed in the common asparagus, in the marsh-mallow, in comfrey, in potatoes, in chestnuts, in leaves of the deadly nightshade, in licorice-root, in the milky juice of lettuce, in the tubers of the dahlia, and in the young shoots of vetches, peas, beans, etc. According to Piria, the young shoots of these plants, when formed in the light, contain as much asparagine as when they are grown in the dark, but the asparagine disappears as the plant arrives at the flowering stage. Other chemists, including Pasteur, find that the vetches grown in light are free from asparagine. This substance is readily obtained from the expressed juice of the young shoots of asparagus, of young vetches, etc., which, after filtration and evaporation to a syrup, soon deposits it in crystalline prisms of a right rhombic form. These crystals dissolve freely in boiling water, the cooled solution having a mawkish and cooling taste, and a slight acid reaction. Asparagin exhibits two remarkable transformations. (1) When its aqueous solution is heated with alkalies or acids, it is decomposed into aspartic acid, $C_4H_7NO_4$, and ammonia; from this and other reactions, there is no doubt that it should be regarded, according to modern views, as the amide (q.v.) of aspartic acid. (2) While a solution of pure asparagine-crystals remains unchanged, if any coloring matter is present the solution passes into fermentation, and the whole of the asparagine is converted, by the assimilation of hydrogen, from the pigment into succinate of ammonia, a reaction which may be expressed as follows:

Asparagin. Succinate of Ammonia.

$$C_4H_8N_2O_3,H_2O + H_2 = 2NH_3,C_4H_4O_4$$

Like most of the amides, this substance unites both with acids and alkalies, but the resulting compounds are of little general interest. That asparagine plays an important part in the physiology of plants, is obvious from its wide distribution.

ASPARAGUS, n. *ăs-păr'ă-gŭs* [L.—from Gr. *aspar'agos*], a well-known plant, whose turios or young shoots are used at table; the cultivated *Aspar'agus offic'ina'lis*, ord. *Liliă'-*

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cēs. ASPARAGINOUS, a. *ăs'păr-ăj'ĭ-nŭs,* eaten like asparagus. ASPARAGIN, n. *ăs păr'ă-jĭn,* or ASPAR'AMID, *-mĭd,* a crystalline substance obtained from asparagus. ALPAR'AGUS-STONE, a translucent mineral of a greenish-yellow color, sometimes passing into a wine color. See APATITE. ASPAR'TIC ACID, an acid obtained from asparagine.

ASPAR'AGUS: genus of plants of the nat. ord. *Liliaceæ,* having an almost bell shaped six-partite perianth upon an articulated stalk, six stamens, one style, with three recurved stigmas, and the cells of the berry two-seeded. The species of this genus are herbaceous or shrubby plants, natives chiefly of the s. of Europe and of Africa, with abortively diœcious flowers; the stem is unarmed in some, in others thorny; at its first sprouting leafless, and covered with scales at the top; afterwards very much branched, with

Asparagus.
a, a young shoot; *b*, flowers; *c*, the upper end of a stem, showing branches, leaves, and fruit (all reduced).

numerous fasciculate, generally bristle-like leaves. The most widely diffused species is the Common A., *A. officinalis,* a native of Europe, which grows on the banks of rivers and on the seashore, in meadows and bushy places, especially in sandy soils, and it is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the earth, being a much esteemed article of food, though in only a slight degree nutritious. These sprouts contain a peculiar crystalline substance, called *Asparagine,* (q.v.) and have a specific action on the urinary organs, so that their long continued use in very large quantities is apt even to produce bloody urine. They are no longer retained in the pharmacopœia, but both the shoots and roots of A.

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are still occasionally used as a diuretic in dropsies, and as a lithic to dissolve urinary calculi. A. was grown by the ancient Romans, but has been greatly improved by cultivation. It is propagated usually by seeds which may be sown where the crop is to be produced, though transplanting in the spring after sowing is usual. The ground should be deeply trenched or plowed and a very heavy coating of manure incorporated with the soil. Rather light, sandy ground is preferred. Plants may be set in spring or fall, in rows 2–3 ft. apart and 9 in. apart in the row, and should be kept free from weeds. In cold regions, on the approach of winter, the ground should be covered with stable manure to the depth of 3 or 4 in., which should be forked into the ground early in the spring. In warm climates manure should be applied in the spring. Cutting can be commenced in three or four years from sowing the seed, and the bed should remain productive 20 years. There are about a dozen varieties.—The A. beetle (*Crioceris asparagi*), introduced from Europe about 1860, is often very destructive. Hand-picking, letting domestic fowls run among the plants, the use of pyrethrum powder, and destroying all A. plants except those required for shoots, are the principal remedies. —A kind of spirit is sometimes made from A. seed, and the berries form a substitute for coffee. The shoots of several other species also are eaten, as those of *A. tenuifolius*, *A. acutifolius*, and *A. albus*, natives of the s. of Europe. On the other hand, the sprouts of the Bitter A., *A. scaber*, which is very similar to the Common A., are uneatable on account of their great bitterness. Climbing A. with exquisite feathery leaves is cultivated as an ornamental plant.

ASPASIA, *ăs-pā'shĭ-a* [Gr.—from *Aspasia* (q.v.), or *aspazomai*, to welcome kindly]: genus of plants belonging to the order *Orchidaceæ*.

ASPASIA, *ăs-pā'shĭ'ā:* B.C. 5th c.: one of the most remarkable women of antiquity; b. Miletus, dau. of Axiochus. The fact that in Athens all foreign women, whatever their character, were equally esteemed, or rather disesteemed, and that their children, even when begotten in wedlock, were held illegitimate, has originated the erroneous notion that A. was a courtesan. She certainly broke through the restraint which confined Athenian matrons to the seclusion of their own homes; for after her union with Pericles, who had parted from his first wife by her own consent, her house became the rendezvous of all the learned and distinguished people in Athens. Socrates often visited her. Her eloquence and knowledge of politics were extraordinarily great. Her husband—though, strictly speaking, the Athenian law would have refused this appellation to Pericles—was honored with the title of Olympian Jove, while she herself was dignified with the name of Juno. From the comic writers and others, she received much injustice. It was Hermippus, the comic poet, who took advantage of a temporary irritation of the Athenians against Pericles, to accuse A. of impiety; but the eloquence of the great statesman disarmed the enmity of the judges, and procured her acquittal. Her influence over Pericles must have been singularly great, though it has obviously been exaggerated,

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and even caricatured. The brilliant but not historically accurate Aristophanes charges her with the origin both of the Samian and Peloponnesian wars, the latter on account of the robbery of a favorite maid who belonged to her. Plutarch vindicates her against such accusations; and Thucydides, who details minutely the causes of the Peloponnesian war, does not mention her name in connection with these. After the death of Pericles, A. married Lys'icles, a cattle-dealer (an important, lucrative, and dignified profession in ancient times), who, through her influence, soon became an eminent man in Athens. The name of A. was, after her death, applied to many women of remarkable accomplishments and amiability.

ASPASIOLITE, *ăs-pā'zĭ-o-līt* [Gr. *aspasios*, greatly welcomed]: a mineral of a green or grayish color. It occurs in Norway with iolite, of which it may be only an altered state.

ASPÉ, *ăs'pā:* t. of Valencia, Spain, province of Alicante; 21 m. w. from Alicante, near the river Elcha. It is moderately well built, but the streets are narrow and winding. It has numerous flour-mills and oil-mills, also soap-manufactories and brandy distilleries. There is considerable trade in wine. Pop. 6,744.

ASPECT, n. *ăs'pĕkt* [L. *aspectus*, looked at attentively—from *ad*, *specto*, I look]: that which looks towards; look; appearance; position or situation; view. ASPECT'ABLE, a. that may be looked at or beheld.

AS'PECTS, in Astronomy: certain positions of planets with respect to one another, as seen from the earth. In the days of astrology, there were five Aspects—Conjunction (indicated by the symbol ☌), Sextile (✶), Quartile (□), Trine (△), Opposition (☍). Two planets are in conjunction when they have the same longitude; the aspect is sextile when they are 60° apart; quartile, when the distance is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these A. great influence over the fate of individuals and of nations. The only two of the terms now in use are *conjunction* and *opposition*.

ASPEN, n. *ăs'pĕn*, or ASP [AS. *æspen:* Icel. *ösp*, aspen]: a tree of the poplar kind whose leaves quiver or shake at the slightest breath of air; the *Popŭlus tremŭla*, ord. *Salĭcĭnĕæ:* ADJ. pertaining to an aspen.

AS'PEN, or TREMULOUS POPLAR (*Pop'ulus trem'ula*, see POPLAR): tree frequent in Europe and in Siberia. It is a native of Britain, and is frequent in Scotland, where it is found even 1,500 ft. above the sea. It has received the specific name *tremula*, from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind—a property for which, indeed, the aspen-leaf has become proverbial. The leaves are nearly orbicular, but broadly toothed, so as almost to exhibit angles. The footstalks are compressed, which favors the readiness of motion. It grows quickly, with a straight stem, reaching

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to a height of from 60 to 80 or even 100 ft. In unfavorable situations, it becomes dwarfish. The wood is soft, porous, light, white, and smooth; it does not make good fuel, but is very fit for the turning-lathe, and especially for being made into troughs, trays, pails, etc. It is deemed excellent for arrows. If the stem be peeled and allowed to dry before it be cut down, the wood becomes harder, and is then capable of being used as timber for the interior of houses; and on this account the tree is of great importance

Aspen (*Populus tremula*) reduced.
a, a portion of a branch with catkins; *b*, do., with leaves.

in many districts, and the more so as it succeeds in any soil, although it prefers one which is moist and gravelly. The bark contains a great quantity of a bitter alkaloid, *Salicin*. The charcoal made from this tree can be used in the manufacture of gunpowder.—*Populus tremuloides*, a similar species, native of N. America, is called the American A. It is regarded by some as a mere variety. Very similar, also, is another N. American species, *P. grandidentata*, ovate, large-toothed leaf, instead of cordate.

ASPER, n. *ăs'pĕr* [L. L. *asperus, asprus, asperum, asprum:* mod. Gr. *aspros*, white: Turk. *aqtscheh, aktsche*, white—used substantively as the name of a coin]: an old Turkish silver coin, worth a little more than one cent.

ASPERATE, v. *ăs'pĕr-āt* [L. *aspĕrātus*, made rough—from *asper*, rough]: to make rough or uneven. As'PERATING, imp. As'PERATED, pp. ASPERATION, n. *ăs'pĕr-ā'-shŭn*. ASPER, or ASPRE, a. *ăs'pĕr*, rough: sharp in sound; bitter in spirit: N. the rough breathing (') placed over the initial letter of many Greek words, when that letter is a vowel, and over the second letter if a diphthong. It indicates that the vowel is to be aspirated, i.e., pronounced as if *h* preceded it. It is used also before *ρ* at the

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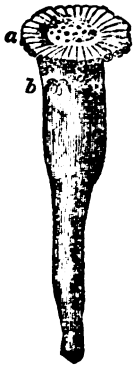
beginning of a word, to indicate that it should be pronounced like *rh*.

ASPERGES, n. *ăs-pĕr'jēs* [L. *asper'ges*, first word of prayer from Ps. li. 7, '*Thou shalt sprinkle* me, O Lord, with hyssop,' etc]: formula sung in the *R. Cath. Ch.* by the priests while sprinkling holy water over the congregation, or over the sick; the instrument by which this is done, consisting of a broad brush with a handle. See ASPERGILL.

ASPERGILL, n. *ăs'pĕr-jĭl*, or ASPERGILLUS, n. *ăs'pĕr-jĭl'lŭs* [L. *aspergo*, I scatter or throw]: in the *R. Cath. Ch.* a short staff surmounted by a brush for sprinkling holy water. AS'PERGIL'LIFOR'MIS, a. *-jĭl'lĭ-fôrm'ĭs* [L. *forma*, shape]: in *bot.*, applied to little tufts of hair which assume the form of a brush.

ASPERGILLUM, *ăs'pĕr-jĭl'lŭm:* remarkable genus of Lamellibranchiate Conchiferous Mollusca, in which the shell has the form of an elongated cone, terminating at the larger end in a disk, which is pierced with numerous small tubular holes, the little tubes of the outer range being largest, and forming a sort of ray around it. The animals of this genus are borers, some of them living in sand, others burrowing in stone, wood, or thick shells. *A. Javanum* is popularly called the Watering-pot, and the same resemblance has suggested the name A. (from the Latin *aspergo*, to sprinkle). The most interesting feature in the structure of the shelly tube of A. is the presence of two small valves, incorporated in the substance of the tube, to which they bear a very small proportion. 'They there form the stamp,' says Owen, 'of its true affinities, but subserve as little any ordinary final purpose as the teeth buried in the gums of the fetal whale. The affinities are with mollusca inhabiting bivalve shells. A rudimentary bivalve shell is found, in like manner, cemented into the shelly tube of the fossil *Teredina*, which bored the drift-wood of the London clay.



Aspergillum. *a*, the disk with holes; *b*, the rudimentary valves.

There is also a genus ASPERGILLUS in Botany containing many of the small fungi commonly known by the name of mould (q.v.), which occur on decaying substances of various kinds. Some of the species are peculiar to diseased animal tissues.

ASPERGILLUS: genus of fungi comprising many of the species of common molds.

ASPERIFOLIÆ, *ŏs-pĕr-ĭ-fō'lĭ-ē* [L. *asper*, rough; *folium*, a leaf]: Linnæus's name for the natural order of plants now called *Boraginaceæ*, or Borageworts.

ASPERIFOLIOUS, a. *ăs'pĕr-ĭ-fōl'ĭ-ŭs*, or ASPERIFO'LI-

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ATE, *-āt*. [L. *asper*, rough; *fo'lium*, a leaf]: having leaves rough to the touch.

ASPERITY, n. *ăs-pĕr'ĭ-tĭ* [F. *aspérité*, roughness—from L. *asperitas*, roughness—from *asper*, rough]: roughness of surface; the quality that grates on the ear; sourness; harshness.—SYN. of 'asperity': acrimony; animosity; tartness; harshness; moroseness; crabbedness; sourness; sharpness.

ASPERMOUS, a. *ă-spĕr'mŭs* [Gr. *a*, without; *sperma*, seed]: in *bot.*, without seed.

ASPERN, *ăs'pĕrn*, or GROSS ASPERN: village of Austria, on the left bank of the Danube, 5 m. e.n.e. of Vienna. Pop. abt. 700.

This and the neighboring village of Essling are celebrated as the scene of a sanguinary battle in the summer of 1809, between the French army under Napoleon I. and the Austrians under Archduke Charles. After the battle of Eckmühl, in which the Austrians were defeated, the archduke retired to the left bank of the Danube, leaving the road to Vienna open to the French. The French army entered Vienna, 1809, May 12, when the archduke concentrated his forces on the opposite bank of the river. Napoleon threw bridges over the river, and on the 21st the French army began crossing to the attack. The Austrians at first seemed to give way; but when about half the French had crossed the river, they returned to the charge and almost surrounded the enemy in the narrow plain between the two villages. Here ensued the battle of A., a terrible conflict, the grand object of the contending hosts being the possession of the villages. At the close of the day, it remained undecided; but next morning it was renewed with fury on either side, when, after terrible slaughter Napoleon ordered a retreat, and his shattered ranks retired to the little island of Lobau, in the middle of the river, whence they afterwards slowly withdrew to the right bank. The loss on the side of the Austrians was given at 4,000 killed and 16,000 wounded; that of the French at double that amount. Marshal Lannes, the most daring among the French generals, was among the slain. Both the villages were reduced to heaps of ruins.

ASPERNATION, n. *ăs-pĕr-nā'shun* [L. *aspernatio*—from *ab*, from; *spernor*, to despise]: contempt; disdain.

ASPEROLITE, *as-pĕr'o-līt* [L. *asper*, rough: Gr. *lithos*, stone]: a variety of chrysocolla.(q.v.) It is a very brittle mineral, of a bluish-green color, found in Tagilsk, Russia.

ASPERSE, v. *ăs-pĕrs'* [L. *aspers'us*, besprinkled]: to sprinkle over; to cover all over with evil reports; to slander. ASPERS'ING, imp. ASPERSED, pp. *ăs-pĕrst'*, slandered. ASPERS'ER, n. *-ĕr*, one who. ASPERSION, n. *ăs-pĕr'shŭn*, a sprinkling, as with dust or water; the act of spreading foul and slanderous reports. ASPERSORY, a. *ăs-pĕr'sĕr-ĭ*, defamatory. ASPER'SIVE, a. *-sĭv*, involving aspersions; calculated to asperse. ASPER'SIVELY, ad. by way of aspersion.—SYN. of 'asperse': to slander; detract; defame; calumniate; vilify; vilipend.

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ASPERSORIUM, n. *ăs-pĕr-sō'rĭ-ŭm* [L.L. *aspersorium:* Ital. *aspersorio*]: the stoup, or holy-water basin, in mediæval churches; the aspergill (q.v.).

ASPERUGO, *ăs-pĕr-ū'gō* [L. a plant with prickly leaves —from *asper*, rough]: genus of plants belonging to the order *Boraginaceæ*. It contains only one species, *A. procumbens*, or German Madwort, a very hispid plant, with solitary blue flowers in the axils of the leaves.

ASPERULA: see WOODRUFF.

ASPETTI, *ăs-pĕt'tē*, TIZIANO: 1565–1607: b. Padua; d. Pisa: sculptor, said to have been a nephew of the painter Titian. This, however, is doubtful, as Titian was born in 1477. A. worked at Venice, Padua, Florence, and Pisa. Vasari calls him the Titian of Padua, and praises his work highly. A statue of St. Anthony at Padua, and statues of Sts. Peter and Paul on the façade of St. Mark's Church at Venice, are among his works.

ASPHALT, or ASPHALTUM, n. *ăs-fălt'* or *ăs-făl'tŭm* [L. *asphaltum;* Gr. *asphaltos*, bitumen—from Gr. *a*, not; *sphallo*, I cause to slip]: a compact form of bitumen (q.v.); a blackish or dark-brown substance of solid consistence. ASPHALTIC, a. *ăs-făl'tĭk*, pertaining to asphalt. ASPHALTING, process of covering or of paving with asphaltum. ASPHALTOTYPE, negative photograph produced on a plate coated with a film of bitumen.—*Asphalt* appears to be the hardened form of more liquid bituminous substances, e.g., petroleum, which have oozed out of the ground. The largest natural deposit of A. is the Pitch Lake in the island of Trinidad (q.v.). A. is found also on the shores of the Dead Sea in large quantity. Artificial A. is made from gas-tar (q.v.). The various kinds of A. have a pitchy odor, when pure a resinous lustre, do not soil in handling; are insoluble in water, sparingly soluble in alcohol; but are in great part dissolved by ether, oil of turpentine, and naphtha, in which respect A. differs essentially from coal. *Petroleum* (q.v.) is essentially A. dissolved in naphtha. The specific gravity of A. is very near that of water, ranging from 1,000 to 1,100. A. was employed by the ancient Egyptians for embalming their dead, and was used in Babylon as mortar. Its modern applications are numerous. It is an ingredient in Japan varnish, and in the enamel on 'patent leather'; and is used with other materials to make waterproof roofing and flooring, linings for cisterns, and with pasteboard materials in construction of water-pipes. It is much used to form 'damp courses' in walls of buildings—i.e., a layer of it, ¼ inch to ½ inch thick, is spread over the thickness of a wall near the ground-level, to prevent ascent of damp; and frequently the whole internal ground area of a house is covered with a layer of A. Where a house-wall is against a bank of earth, the whole surface is protected from damp by a lining of it. Timber for use in constructions under water is made more durable by saturation with A. heated. One or two kinds of A., such as those found at Seyssel in e. France, and at Val-de-Travers in Switzerland, are really bituminous limestones: the latter is known all over the world as a material for pavement (q.v.). This Val-de-

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Travers A. is prepared by reducing the natural rock, which contains 7 to 20 per cent. of bitumen, to powder, and then putting it with some melted bitumen into a caldron. After being fused and stirred for some time, it is run into molds to form blocks of about 1 cwt. each. These blocks are called 'asphaltic mastic,' and the finest kinds contain 87 per cent. of carbonate of lime and 13 of bitumen, and should not melt below 168° F. It has, especially since 1854, been extensively used in paving streets on the European continent, and foot-ways in British cities. In the United States, the A. used is mostly made of refuse tar from gas-works, mixed with slaked lime and gravel (see GAS-TAR). The *pigment* known as asphaltum is prepared sometimes from natural A., but usually from the residue of distilled bituminous substances. Unfortunately, its fine transparent brown color has tempted some distinguished modern artists to use it largely. Through its property of not drying thoroughly and free of cracks, several fine pictures painted years ago by Horace Vernet, Sir George Harvey, and others, are now mere wrecks.

ASPHALTIC COAL: a substance resembling coal, found in the cavities of the older rocks, and supposed to have been deposited in a liquid or plastic state. There are many varieties, differing in composition and reactions, so that A. C. is not a species, but a general name. One is Albertite (q.v.); another, Grahamite, in W. Virginia; another, Uintahite, in Utah; so, also, Cloustonite, Orkney, etc. They are not true coal, but supposed to be derived from inspissated mineral oil, and some occur in fissures.

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ASPHODEL, n. *ăs'fō-dĕl* [Gr. *asphŏd ĕlŏs*, a plant sacred to Proserpine, daffodil]: a general name for certain hardy perennial plants, the yellow and white being common garden flowers; the day-lily, called also the king's spear; properly *Hemĕrōcăl'lis* is the day-lily, and *Asphŏd'ĕlus alba* is the common garden plant, formerly called king's spear—both of *Lilĭăcĕæ:* this genus of plants has by many botanists been made the type of a nat. ord. *Asphodeleæ;* now, however, it is generally regarded as forming part of the order *Liliaceæ*. The *Asphodeleæ* are either fibrous-rooted or bulbous-rooted. Among the latter are onions, hyacinths, squills, star of Bethlehem, etc.; among the former, asparagus, A., etc. The roots of the asphodels are

White Asphodel.

fleshy and thick. The species are not very numerous, and are natives mostly of the countries around the Mediterranean Sea. The Yellow A. (*A. luteus*) and the White A.

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(*A. albus*) have long been known and prized as garden-flowers. The yellow A. has an unbranched stem 2–3 ft. high, much covered by the sheathing bases of the long narrow leaves. The leaves of the white A. are all radical, and its flowers are in branched clusters. Both species flower about the time when spring passes into summer.

ASPHYXIA, n. *ăs-fĭk'sĭ-ă*, or ASPHYXY, n. *ăs-fĭk'sĭ* [Gr. *asphuxiă*, the stopping of the pulse—from *a*, without; *sphuxis*, the pulse—*lit.*, pulselessness]: the temporary or permanent cessation of the motions of the heart as in drowning and suffocation, due to the want of air, or the presence of irrespirable gases. ASPHYXIATE v. *ăs-fĭks'ĭ-āt*, to suffocate, as in drowning, or by breathing the fumes of certain burning substances. ASPHYX'IA'TING, imp. ASPHYXIATED, pp. a. *ăs-fĭks'ĭ-ā'tĕd*, suffocated as by hanging or drowning, or by an accumulation of carbonic acid in the blood.

ASPHYXIA, *ăs-fĭk'sĭ-ă*, or ASPHYXY, *ăs-fĭk'sĭ*: term usually applied to the condition resulting from the blood in the body no longer being brought into the proper relations to the atmospheric air by respiration, so as to allow a sufficiently free exchange of carbonic acid for oxygen. See RESPIRATION. A. may result from several causes. No air, or but a scanty supply, may be admitted, as in strangulation, drowning, choking, or disease in the windpipe; the chest may be prevented from expanding either from a superincumbent weight or paralysis, as when a man breaks the upper part of his neck above the phrenic nerve, thus paralyzing the diaphragm; again, although there may be every capacity for respiration, the air itself may be in fault, and contain too little oxygen in proportion to other elements, such as carbonic acid or sulphuretted hydrogen, which when inhaled act as poisons. Aquatic animals may be asphyxiated either by depriving of oxygen the water that they inhabit, or by impregnating it with the gases above mentioned.

As the condition of A. advances, in drowning or otherwise, the small vessels of the lungs become gorged with blood, which the heart no longer has power to force freely through them, the right side of the heart and pulmonary artery become filled with blood, while but little returns to the arterial or left side of the heart.

The person becomes pallid, except in such vascular parts as the lips, cheeks, and finger-tips, which become blue; and soon the blood, no longer aerated, produces the phenomena of poisoning by carbonic acid. After some slight convulsive movements the person becomes insensible, the pulsations of the heart grow gradually feebler, and at last cease altogether. In man this occurs in from a minute and a half to five minutes. Some persons, as the Ceylon divers, can by habit do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood-vessels by which they are enabled to be under water for a long time. Restoration of asphyxiated persons may be attempted with hopes of success at a very long period after apparent death. The object of all meth-

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ods is, of course, to fill the lungs with fresh air. One of the most efficient is that of the late Marshall Hall: Lay the person down at once with his head on his left arm, open the mouth, and draw the tongue forward, then roll him gently over towards the left till he is nearly quite over on his face, then on to his back again, making the body by its own weight compress the chest, which, on expansion by its elasticity, fills with air. Repeat this about 15 times in a minute. This remedy nearly superseded all others for the restoration of still-born infants and other asphyxiated persons, before the introduction of the method of Dr. Sylvester, an account of which is given under RESPIRATION, ARTIFICIAL.

ASPHYX'IANTS: chemical substances enclosed in shells or other projectiles, which when set free produce a suffocating and poisonous effect. The French secretly made experiments with asphyxiating shot at Brest in 1851. The principle of these missiles seems to have been to carry into an enemy's ship the means of generating deadly gases which would suffocate the crews between decks. Scientific artillerists dread and discountenance these novelties; they have learned to regard war almost as a mathematical science, or, at any rate, as an elaborate application of such science; and they see nothing but savage cruelty in the 'diabolical chemistry' of asphyxiants. Gen. Sir Howard Douglas, in a late edition of his *Naval Gunnery*, says: 'The author learns, with great regret, that some awful experiments have been made with fearful success, in the royal arsenal, with asphyxiant projectiles, combining in a frightful degree incendiary with suffocating effects.' The Earl of Dundonald, Capt. Norton, Mr. Macintosh, and many other inventors, some years ago brought asphyxiating compositions to the notice of the English admiralty and War-office; and the French arsenals were known to possess many such in store. Some of these compositions are liquids which burn fiercely, and ignite wood and canvas readily; some are contained in shells which, on bursting, scatter the suffocating and burning substances all around; and some assume other forms.

ASPIC, n. *ăs'pĭk* [F. *aspic:* Eng. *spike*, lavender-spike, corrupted from OF. *espic:* L. *spicus*, lavender]: savory jelly extracted from meat, as calves' feet, veal, ham, etc., together with onions, carrots and savory herbs, flavored with wine, liquors, etc.

ASPIC: see ASP 1.

ASPIDIUM: see FERN, MALE.

ASPIDOPHORUS, *ăs-pĭd-ŏf'ĕr-ŭs* [Gr. *aspis*, a small, round shield; *phoros*, carrying]: genus of fishes of old order *Acanthopterygii* and the family with hard cheeks. (Cuvier).

ASPIDORHYNCHUS, n. *ăs'pĭ-dō-rĭng'kŭs* [Gr. *as'pida*, shield; *rhungchos*, a beak]: a genus of fossil fishes characterized by the tapering or beak-like prolongation of their upper jaws, armed with numerous sharp-pointed conical teeth.

ASPINWALL, *ăs'pĭn-waul:* town in Colombia, virtually a colony of the United States; at the Atlantic ex-

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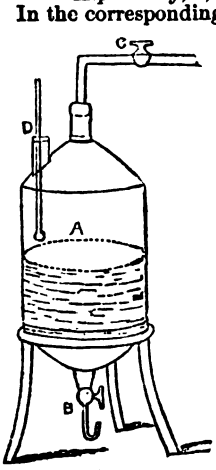
tremity of the Panama railway, and of the interoceanic canal in progress; about 8 m. to the n. of the old Spanish port of Chagres, 49 m. from Panama, and equidistant from the great trading capitals of Valparaiso and San Francisco. From its commanding position as a place of transit, A. is one of the busiest and most prosperous towns in the new world. It monopolizes the benefits of the traffic in both directions, to the almost utter exclusion of the rapidly decaying Panama. The climate of A., formerly very unhealthy, has been greatly improved by drainage. A. derives its name from Mr. Aspinwall, the originator of the Panama r.r. *Colon* is the P. O. name: A. is not recognized.

AS'PIRATE: name given to the letter *h* in grammar, as marking, not an articulate sound, but a *breathing*. It is applied also to a class of consonants. There is felt at once to be a relation, accompanied by a difference, between *p* and *f*, *t* and *th*, etc. To express the difference, the Greeks called the first of such a pair *psilon* (bare), the second *dasu* (rough); the Latin grammarians adopted the terms *lene* and *aspirate*, probably from the erroneous notion that the difference consists in the addition of the sound of *h*. There being no sound and no character in Latin corresponding to the Greek θ (*theta*), the Romans represented it by *th;* and this misleading expedient is continued for representing this aspirate and several others in all the alphabets derived from the Roman. According to some, the word ought to be *asperate*, i.e., 'roughened.' Of the sixteen mutes in a complete system (see LETTERS), eight are lene, each having its corresponding aspirate.

Lene— *p, b, t, d, k, g, s, z.*
Aspirate—*f, v, th*(in), *th*(ine), *ch, gh, sh, zh.*

In the corresponding words of allied languages, nothing is more common than the interchange of an aspirate and lene: Ex., Lat. *pater*, Eng. *father;* Gr. *thura*, Ger. *thür*, Eng. *door;* Lat. *cap*(ut), Fr. *chef*, Eng. *chief;* Ger. *weib*, Eng. *wife*. Aspirated letters are also frequently interchangeable with one another: thus, Gr. *ther*, a wild beast, is in Lat. *fera:* Lat. *facere*, to do, becomes in Span. *hacer*.



Aspirator.

ASPIRA'TOR: apparatus employed to draw air or other gases through bottles or other vessels. It is of great use in the examination of gases by the analytic chemist. The simplest form is that represented in the figure, where A. is a large vessel capable of being filled with water, having a tube with stop-cock at B, a second tube with stop-cock at C, and a thermometer introduced at D. In working, the apparatus is filled

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with water; the tube C is attached to the vessels through which the gas is to be drawn; and the stop-cocks at C and B being opened, the weight of the water escaping at B acts as suction, and draws in the gas from the tube C and the attached bottles or other vessels. The thermometer at D denotes the temperatures of the water, and subsequently gas, contained in the reservoir, while the upright turn of the tube B keeps any air from entering the reservoir by that route.—A more complicated form of A., but much more convenient to experiment with, is that known as Brunners' A.; the principle of action, however, is the same.

ASPIRE, v. *ăs-pīr'* [F. *aspirer*—from L. *aspīrārĕ*, to breathe or blow towards—from *ad*, *spīro*, I breathe—*lit.*, to breathe towards]: to desire with eagerness; to pant after; to aim at something that can be obtained with difficulty. ASPI'RING, imp.: ADJ. ambitious: N. the desire of some thing great. ASPIRED, pp. *ăs-pīrd'*. ASPI'RER, n. one who. ASPI'RINGLY, ad. *-lĭ*. ASPIRANT, n. *ăs-pī'rănt*, one who seeks with eagerness. ASPIRATE, v. *ăs'pĭ-rāt* [L. *aspīrātus*, breathed towards]: to pronounce with a full breath: N. a letter with a mark to show it must be pronounced with a full breath: ADJ. pronounced with a breathing. AS'PIRA'TING, imp. ASPIRATED, pp. *ăs'pĭ-rā'tĕd*. ASPIRATION, n. *ăs'pĭ-rā'shŭn* [F.—L.]: the act of pronouncing a letter with a full breath; an ardent wish or desire to attain. AS'PIRA'TOR, n. *-rā'tĕr*, an apparatus employed by chemists for drawing air or a gas through bottles. ASPIRATORY, a. *ăs-pī'rā-tĕr'ĭ*, pertaining to breathing.

ASPIS, *ăs'pĭs*, or CLUPEA, *clū'pe-a:* an ancient town situated on the Mediterranean, abt. 50 m. e. of Carthage, to which it belonged. It was fortified and had an accessible harbor. In the first Punic war, Manlius and Regulus landed at A., and in the third war it sustained a siege. It is also mentioned in connection with the Julian civil war. From A.D. 411 to 646, it was an important bishopric, and was the last place in Africa where the Christians resisted the Moslems.

ASPIS: a governor under Artaxerxes, in the neighborhood of Cappadocia. Having incited the country to revolt, he was captured by Datames, and was put to death.

ASPLENIUM, *ăs-plē'nĭ-ŭm:* genus of Ferns, of the ord. or sub-ord. *Polypodiaceæ*. The species are numerous, and widely diffused in both the northern and southern hemispheres. Many of them are of great beauty; and the small size of some recommends them to cultivators of ferns who have limited space. Some of the species bear the English name *Spleenwort*, as *A. Trichomanes*, *A. viride*, *A. Adiantum-nigrum*, etc., having been formerly supposed efficacious in removing obstructions of the viscera. From the same circumstance the name A. [Gr. *a*, privative, and *splen*, the spleen] is derived. They have now fallen completely into disuse, but were at one time very much employed, chiefly in the form of a syrup like *Capillaire* (q.v.),

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and were administered not only in cases of cough, asthma, diseases of the liver, and cutaneous diseases, but even in stone and gravel. But perhaps none of them was so extensively used as the species which is styled in old books Common Spleenwort (*A. Cet'erach*), now the type of a distinct genus, and known as *Cet'erach officinarum*. The genus A., in our species, has the spore-clusters (sori) long, on the inner side of the unbranched veins, oblique to the midrib of the leaf-lobe—rarely on both sides. There are nine species in e. and central United States, of which *A. Trichomanes* is one of the most common, with tufts of slender leaves.

ASPORTATION, n. *ăs'pŏr-tā'shŭn* [L. *asportātĭōnem*, a carrying or taking away—from *ab*, from; *porto*, I carry]: act of carrying or conveying away.

ASPREDO, *ăs-prē'dō* [L. *aspredo*, roughness]: genus of fishes of the sub-class *Teleostei*, order *Teleocephali*, and family *Siluridæ*. They are the only known fishes which have no mobility in the operculum. They have six or eight barbels. They are akin to the famous Electric Silurus or 'eel' of the Nile and Senegal rivers.

ASPRO, *ăs'prō* [Gr. *aspros:* L. *asper*, rough]: genus of spiny-finned fishes belonging to the Perch family. They live in the Rhone, Danube, and other rivers.

ASPROMONTE, n. *ăs-prō-mŏn'tē:* a mountain in s.w. Italy, near which, 1862, Aug. 28, a battle took place between Garibaldi's troops and those of Pallavicini. During the fight, Garibaldi was wounded and captured. He was afterward sent to Caprera. A. is near Reggio.

ASPROPOT'AMO: see ACHELOUS.

ASQUINT, ad. *ă-skwĭnt'* [Dut. *schuinte*, a slope, obliquity (see ASKANCE)]: toward one side; obliquely.

ASQUITH, HERBERT HENRY: English statesman: b. Morley, England, 1852, Sep. 12; son of J. Dixon A. He was educated at the City of London School, and at Balliol Coll., Oxford, of which he was scholar, and afterward fellow, receiving his degree B.A., 1874. He studied law, was called to the bar at Lincoln's Inn 1876, June, and appointed queen's counsel 1890, Feb. In 1886 A. was elected member of parliament for East Fifeshire. He was engaged as one of the counsel for Charles S. Parnell in the trial before the 'Parnell Commission,' 1888–90; he also appeared in the celebrated 'baccarat' trial, 1891. He was appointed home sec. in Gladstone's cabinet, 1892, Aug. 16. He married, 1877, Helen, daughter of F. Melland, of Manchester, England.

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ASS, n. *ăs* [L. *asĭnus*, an ass: Icel. *asni:* W. *asyn:* Ger. *esel:* Pol. *osiol*, an ass]: a well-known beast of burden, dull and slow, but patient and hardy; a dull, stupid person. ASININE, a. *ăs'ĭ-nĭn*, pertaining to an ass; like an ass. ASSES' BRIDGE, Proposition V. Book I. of Euclid's Geometry, being the first difficult proposition.

ASS (*Equus Asinus*): a well-known quadruped, usually referred by naturalists to the same genus as the horse (q.v.): though there are recent attempts to make it a type of a distinct genus (*Asinus*), including all the solid-hoofed quadrupeds (*Solidungula* or *Equidæ*, see HORSE) except the horse itself. The distinction is founded on the short hair of the upper part of the tail and the tuft at the end of it, the darker stripes with which the color is marked, and the absence of the hard horny warts which are found on the hinder-legs of the horse, although the fore-legs exhibit warts in a similar position. The long ears of the A. are one of the characteristics of the species, but they are longer in domestication than in a wild state. It is usually also distinguished by a black cross over the shoulders, formed by a longitudinal and a transverse streak, the general color being gray; but when the general color is darker or lighter than usual, the cross is often less apparent, or observed with difficulty. The facial line is arched.

Some uncertainty still exists as to the origin of the domestic A.; a number of wild races having been described, some of which are perhaps, like the wild horses of America, the progeny of animals that have escaped from domestication. The probability, however, appears to be that the A. is a native of Central Asia, where it is found in a perfectly wild state, in Tatary, Mesopotamia, Persia, etc., on the banks of the Indus, and even to the s. extremity of Hindustan; but its range does not extend so far n. as that of the wild horse—which may perhaps partly account for the inferiority of the domestic A. in northern climates. The wild A. is found both in mountainous districts and in plains; vast troops roam over the great Asiatic deserts, migrating according to the season, in summer, as far n. as the Ural; in winter s. to the borders of India. It is fond of bitter and saline herbage, and of brackish water. It was first accurately described by Pallas, under the name *Koulan*, which it bears on the high steppes around the Caspian Sea. It was, however, well known to the ancients, and is called *Onager* and *Asinus sylvestris* by Pliny, who also mentions under the name of *Hemionus*, another species (*Equus Hemionus*), native of the same regions, now called the *Kiang*, or the *Dziggethai*. The latter name appears to be of Turkish origin, and to signify Mountain A., but seems to be sometimes applied to one of these species and sometimes to the other. This seems also to be the case with some of their other eastern names, as *Khur* or *Goor*, and is a source of no little confusion.—The cross on the shoulders is less observable in the Koulan than it usually is in the domesticated A. In one remarkable particular, the domesticated A. agrees with the *Equus Hemionus*, and differs from the Koulan, the infra-orbital

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foramen of the skull being situated much lower. But the Kiang neighs like a horse, and the other *brays*. The harshness of the voice of the A. is ascribed to two small peculiar cavities situated at the bottom of the larnyx.

The allusions to the wild A. in the Old Testament, particularly Job xxxix., naturally excite the surprise of readers acquainted only with the dull domestic drudge, the emblem of patience and stolidity; but to this day they are beautifully appropriate to the wild A. of 'the wilderness,'

The Wild Ass.

which has the 'barren land' or 'salt places' for its dwelling, and the 'range of the mountains' for its pasture.—The wild A. has a short mane of dark woolly hair, and a stripe of dark bushy hair runs along the ridge of the back from the mane to the tail. It has longer legs, and carries its head higher than the domestic A. Its troops have always a leader. It is a high-spirited animal, very fleet

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and very wary, trying to the utmost the powers of the hunter. It is a principal object of the chase in Persia, where its flesh is prized as venison is in Europe, and it is accounted the noblest of game. Xenophon, in his *Anabasis*, describes the wild A. as swifter of foot than the horse, and its flesh as like that of the red deer, but more tender.

The domestic A., also in Arabia, Persia, Syria, and other eastern countries, is a much finer animal than as it is usually seen in Europe, except in Spain, Italy, and Malta, where it is treated better, and is more highly valued. In the east, where it was formerly chosen by the rich and the great, it is still used for riding. It was one of the earliest animals domesticated, but its introduction to n. Europe is comparatively recent. Though sometimes used for light work, the A. is kept in the U. S. principally for raising mules (see MULE). Ky., Tenn., Ill., and Mo. are among the states in which asses are most largely bred. The first valuable stock brought to this country arrived 1787, in which year Gen. Washington, who was interested in breeding mules, received a male and two females from the king of Spain, and a Maltese male and female from Gen. Lafayette. The A. can be kept on much cheaper food than the horse, and is less liable to diseases and accidental injuries. Though commonly regarded as obstinate and stupid, it is, when well bred and kindly treated, both docile and intelligent.

There are two hybrids between the A. and the horse—the MULE (q.v.), bred between the male A. and the mare; and the HINNY (q.v.), the offspring of the horse and the female A.

The milk of the A. contains more sugar of milk and less caseine than that of the cow, and is therefore recommended as a nutritious diet in cases of weak digestion. Its usefulness in cases of consumption has been long known, and it was often prescribed as a kind of specific when that disease was treated on principles very different from those which regulate its treatment now, and when very nutritious food was not usually prescribed to consumptive patients.

The leather called shagreen (q.v.) is made by a peculiar process from the skin of the A., which also affords excellent leather for shoes, and the best material for drums. The bones of the A., which are very solid, were used by the ancients for making flutes.

ASSAB, *ăs-săb':* Italian trading station on the w. coast of the Red Sea, near Bab-el-Mandeb. It was first acquired by a private company of Italians, but passed into the possession of the government of Italy, 1881.

ASSAFŒTIDA: see ASAFETIDA.

ASSAGAY, or ASSAGAI, better spellings of ASSEGAI—which see.

ASSAI, ad. *ăs-sä'ē* [It. *assai:* Fr. *assez*, enough—from L.

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ad, to; *satis*, enough]: in *mus.*, very; as *largo assai*, very slow.

ASSAI, *ăs-sī'*: a beverage much used on the Amazon, prepared from palms nearly allied to the Cabbage Palm (q.v.). The most common species of A. palm is 60 ft. high, with a smooth stem about four inches in diameter. The fruit is small, in size and color resembling sloes, but is produced in great quantity upon branched *spadices*, which are thrown out horizontally beneath the crown of leaves. It consists of a hard seed, with a very thin covering of a firm pulp or flesh. The tree grows in swamps flooded by the high tides. Boys climb the trees for the fruit, upon which warm water is poured, and by rubbing and kneading, a liquid is procured, consisting simply of the pulp of the fruit and water, which is constantly vended in the streets of Pará, and of which the inhabitants are extremely fond. This is A. It is a thick, creamy liquid, of a purplish color, and a flavor like that of a freshly gathered nut. It is commonly used along with the bread made from Manioc (q.v.), called *farinha*, and either with or without sugar. Half the population of Pará make a daily meal of A. and farinha; and upon this hundreds are said chiefly to subsist. The stem of the A. palm is something used for poles and rafters, and its terminal bud as a cabbage or as a salad with oil and vinegar, but it is too much valued for its fruit to be often cut down for these purposes.—Another species, *Euterpe Catinga*, is found in forests of a dry sandy soil and very peculiar vegetation, known as Catinga forests. The beverage made from it is sweeter than the common kind, but the produce of the tree is much smaller.

Assai Palm (*Euterpe oleracea*).

ASSAIL, v. *ăs-sāl'* [F. *assaillir*, to assault—from mid. L. *assaliire*, to assault—from L. *ad*, to; *saliō*, I leap]: to leap or fall upon by violence; to attack with a view to overcome or injure, as in words or writing. ASSAIL'ING, imp. ASSAILED, pp. *ăs-sālď*. ASSAILABLE, a. *ăs-sāl'ă-bl*, that may be attacked. ASSAILANT, n. *ăs-sāl'ănt*, or ASSAIL'ER, one who assails or attacks. ASSAIL'ANT, a. assaulting; attacking. —SYN. of 'assail': to attack; assault; encounter; invade.

ASSAL, *ăs-sāl'*: salt lake in the e. of Africa, 25 m. s.w. of Tajurrah, the chief seaport of Adel; lat. 11° 40′ n., long. 42° 40′ e. Its length is 8 m.; its breadth, 4 m. It lies in a land remarkable for its wild, waste, and sterile character.

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A. is enclosed on all sides but the e. by hills, and is nearly 700 ft. below the level of the sea. Abyssinian caravans resort to it for the purpose of carrying off the salt which incrusts its shores like ice, sometimes to the depth of half a foot. It has been supposed that it was at one time connected with the Bay of Tajurrah.

ASSAM, *ăs-săm' :* province at the n.e. extremity of Brit. India; lat. 23°–28° n., long. 89°–97° e.; 49,004 sq. m.; divided into 13 dists.; principal towns, Gauháti and Sylhet; seat of govt., Shillong. It forms part of the basin of the Lower Brahmaputra, and from that and about 60 other rivers derives exceptional drainage and irrigation. In 1890–1 it had 2,676,271 acres under cultivation, 8,922,310 not cultivated, and 2,358,558 in forests; and of the acreage under cultivation, 1,275,144 were in rice, 230,822 in tea plants, 167,606 in oil seeds, 58,295 in food grains excepting rice, and 17,830 in sugar-cane. There were 722,150 estates, with gross area 7,659,023 acres. Other products are gold, ivory, iron, lead, petroleum, coal, mustard, and musk; the tea crop is usually about three-fourths of the total production in India. Chief imports are woolens, India fabrics, salt, opium, glass, earthenware, tobacco, and betel. One of the most striking features of A. is the abundance of wild animals, such as tigers, rhinoceroses, leopards, buffaloes, and elephants. Of elephants, not less than 500 are annually caught; and, when tamed, bands of them may be seen, harmless as cows, in the charge of a single attendant. The forests teem with game, and the rivers with fish. The province has steamboat communication with Calcutta, Dibroo gurh, and intermediate points; and railway traffic with Calcutta, Dhoobri, and towns between. Of the pop. by 1891 census, 2,997,072 were Hindus, 1,483,974 Mohammedans, 969,765 Animistic, and 16,844 Christians. Education was under encouraging development. The revenue in year ending 1891, Mar. 31, was Rx. 1,027,214; expenditure Rx. 698,480.—In 1826, at the close of the first Burmese war, A. was ceded to the British. The upper portion of the province, however, under a native rajah, till 1838, when, in consequence of his misgovernment, the entire country was placed under Brit. administration. The native state of Manipur, where the Brit. resident and the chief commissioner of A. were massacred 1891, is subordinate to A.—Pop. (1881) 4,881,426; (1891) 5,476,833.

ASSAMAR, n. *ăs'sa-mâr:* in *chem.*, a bitter substance contained in the brown oil obtained by the destructive distillation of cane sugar.

ASSARIUS, n. *as-săr'i-ŭs* [L. *assarius:* Gr. *assarion*—both from L. *as*, a Roman coin]: in classic times, a coin worth nearly two cents. In Matt. x. 29 it is translated penny.

ASSART, n. *ăs-ârt'* [mid. L. *assar'ta:* F. *essart*, land cleared of wood by having the trees grubbed up]: in *OE.*, parts of forests cleared of wood and made arable· in *law* the crime of cutting down forest wood.

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ASSASSIN, n. *ăs-săs'sĭn* [Ar. *hashishin*, drug-eaters—viz., of bhang or extract of hemp—from *hashish*, the intoxicating preparation of the hemp: F. *assassin*]: one of a famous eastern sect of professional murderers, called assassins, stimulated thereto by the use of extract of hemp; one who kills, or attempts to kill, by surprise or by secret attack. ASSASSINATE, v. *ăs-săs'sĭ-nāt*, to kill, or to attempt to kill, by surprise; to murder by a secret attack. ASSAS'SINA'TING, imp. ASSAS'SINA'TED, pp. *-nā'tĕd*. ASSASSINATION, n. *ăs-săs'sa-na'shŭn*, the act of murdering by secret violence or by surprise. ASSAS'SINA'TOR, n. *-sĭ'-nā'tĕr*, a murderer by surprise.—SYN. of 'assassinate': to kill; murder; slay; slaughter.

ASSASSINS: a military order, branch of the secret sect of the Ismailis (q.v.). The secret doctrines of these Ismailis, who had their headquarters in Cairo, declared the descendants of *Ismael*, the last of the seven so-called imaums, to be alone entitled to the caliphate; and gave an allegorical interpretation to the precepts of Islam, which led, as their adversaries asserted, to considering all positive religions equally right, and all actions morally indifferent. The atrocious career of the A. was but a natural sequence of such teaching. The founder of these last, Hassan-ibn-Sabbah-el-Homairi, of Persian descent, and imbued with the free-thinking tendencies of his country, had, about the middle of the 11th c., studied at Nishapur, under the celebrated Mowasek, and had subsequently obtained from Ismaili *dais*, or religious leaders, a partial insight into their secret doctrines, and a partial consecration to the rank of dai. But on betaking himself to the central lodge at Cairo, he quarrelled with the heads of the sect, and was doomed to banishment. He succeeded, however, in making his escape from the ship and reaching the Syrian coast, after which he returned to Persia, everywhere collecting adherents, with the view of founding, upon the Ismaili model, a secret order of his own, a species of organized society which should be a terror to his most powerful neighbors. In 1090, Hassan conquered the fortress of Alamut, in the Persian district of Rudbar; and continued to increase in strength, intimidating princes and governors by a series of secret murders, and gaining possession of several fortified castles, with their surrounding territories, both in the mountain range s. of the Caspian, in Kuhistan, and in the mountains of Syria (Massiat). The internal constitution of the order, which had some resemblance to the orders of Christian knighthood, was as follows: First, as supreme and absolute ruler, came the Sheikh-al-jebal, the Prince or Old Man of the Mountains. His vicegerents in Jebal, Kuhistan, and Syria were the three Dai-al-kirbal, or grand-priors of the order. Next came the Dais and Refiks, which last were not, however, initiated, like the former, into every stage of the secret doctrines, and had no authority as teachers. To the uninitiated belonged, first of all, the Fedavis, or Fedais—i.e., the devoted; a band of resolute youths, the ever ready and blindly obedient executioners of the Old

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Man of the Mountain. Before he assigned to them their bloody tasks, he used to have them thrown into a state of ecstasy, by the intoxicating influence of the *hashish* (the hemp-plant), whence the order was called Hashishin, or hemp-eaters. The word was changed by Europeans into Assassins, and transplanted into the languages of the West with the signification of murderers. The Lasiks, or novices, formed the sixth division of the order, and the laborers and the mechanics the seventh. Upon these, the most rigid observance of the Koran was enjoined; while the initiated, on the contrary, looked upon all positive religion as null. The catechism of the order, placed by Hassan in the hands of his dais, consisted of seven parts, of which the second treated, among other things, of the art of worming themselves into the confidence of men. It is easy to conceive the terror which so unscrupulous a sect must have inspired. Several princes secretly paid tribute to the Old Man of the Mountains. Hassan, who died, 1124, at the age of 70, appointed as his successor Kia-Busurg-Omid, one of his grand-priors. Kia-Busurg-Omid was succeeded in 1138 by his son Mohammed, who knew how to maintain his power against Nureddin and Jussuf-Salaheddin. In 1163, Hassan II. was rash enough to extend the secret privilege of the initiated—exemption, namely, from the positive precepts of religion—to the people generally, and to abolish Islam in the Assassin state; which led to his falling a victim to his brother-in-law's dagger. Under the rule of his son, Mohammed II., who acted in his father's spirit, the Syrian dai-al-kebir, Sinan, became independent, and entered into negotiations with the Christian king of Jerusalem for coming over, on certain conditions, to the Christian faith; but the Templars killed his envoys, and rejected his overtures, that they might not lose the yearly tribute which they drew from him. Mohammed was poisoned by his son, Hassan III., who reinstated Islamism, and thence obtained the surname of the New Moslem. Hassan was succeeded by Mohammed III., a boy of nine years old, who, by his effeminate rule, led to the overthrow of the order, and was eventually murdered by the command of his son, Rokn-eddin, the seventh and last Old Man of the Mountains. In 1256, the Mongolian prince, Hulagu, burst with his hordes upon the hill-forts of Persia, numbering about a hundred, held by the Assassins, capturing and destroying them. The Syrian branch also was put down about the end of the 13th c., but remnants of the sect lingered for some time longer in Kuhistan. In 1352, the A. reappeared in Syria, and indeed they are still reported to exist as a heretical sect both there and in Persia. The Persian Ismailis have an imaum, or superintendent, in the district of Kum, and still inhabit the neighborhood of Alamoot under the name of Hosseinis. The Syrian Ismailis live in the district of Massiat or Massyad. Their castle was taken from them in 1809 by the Nossaris, but afterwards restored. See Hammer, *Geschichte der Assassinen* (Stutt. and Tüb. 1818); Guyard, *Fragments* (1874).

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ASSAULT, n. *ăs-sawlt'* [OF. *assalt:* F. *assaut*, an assault —from L. *assal'tus*, leaped upon—from L. *ad*, *saltus*, a leaping (see ASSAIL)]: an assailing or setting upon; a violent or hostile attack; in *mil.*, the act of attempting to capture a town, etc., by main force: V. to fall upon with violence; to attack in words or writing. ASSAULT'ING, imp. ASSAULTED, pp. *ăs-sawlt'ĕd.* ASSAULT'ER, n. one who. ASSAULT'ANT, n. an assailant: ADJ. leaping upon; assailing. ASSAULTABLE, a. *ăs-sawlt'ă-bl*, that may be assailed or assaulted.—SYN. of 'assault, v.': to attack; assail; encounter; invade; storm; charge:—of 'assault, n.': invasion; attack; incursion; onset; descent; storming; charge; onslaught.

ASSAULT: sudden and violent attack. In A. on a fortified post, the troops are told off into 'storming-parties,' 'supports,' and 'firing-parties.' The storming-parties are those who take the most terrible duty, being that of making a forcible entry into the place. The firing-parties or musketeers seek to shield the storming-parties as much as possible from the fire of the enemy; they spread themselves out in extended order, to keep down the fire of the garrison—aiming at any soldier who may show his head above the parapet, and seeking to disable the artillerymen by firing into the embrasures. Many assaults are made by *surprise;* and in that case the storming and firing parties order all their preliminary movements as quietly as possible. In most cases, there is a necessity for the stormers to descend into a dry ditch, and to ascend from the ditch to a breach or a gate in the fortified wall. To aid in this duty, 'ladder-parties' are placed at the disposal of the storming-parties; these men have previously been practiced in carrying scaling-ladders, descending and ascending ditches, and adjusting the ladders. In some celebrated sieges, ladders 40 ft. long have been used, where the ditch was deep and the wall or bastion high; but it is seldom that a storming-party could venture on so perilous a work, for the men crowded on such a ladder would endanger each other. The 'supports' are troops who keep a little in the rear of the storming and firing parties.

ASSAULT AND BATTERY (see BATTERY), in LAW: the crime of violently attacking, or of offering to do corporal hurt to another. Under *Assault* are involved the offenses of *battery, beating and wounding*, and *mayhem*, since it is implied in them all. The above offenses all involve an actual attack on, and injury to, the person of the party assaulted. But there may be an assault without such actual hurt. Violence or force is not a necessary element in this offense, but the least touching, however trifling, of another's person in an angry, rude, insulting manner, is a battery; for the law, says Blackstone, cannot draw the line between different degrees of violence, and therefore totally prohibits the first and lowest stage of it, every man's person being sacred, and no one having a right to meddle with it in any the slightest manner. The remedy for an injury of this kind may be either by a civil action, as for

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damages, or by indictment, as for a misdemeanor. Where the battery is on a married woman, her husband may sue for damages by action of trespass; if the maltreatment be so serious as to have deprived the husband for any time of his wife's company, the law then gives him a separate remedy, by an action in which he may recover special damage, on the ground of the loss of his wife's society while she was suffering from the beating.

Assault without actual hurt or violence is a *common assault*, and hence in criminal law, assaults are distinguished by their being *common* or *aggravated*. A common assault has been defined as an attempt or offer to do a corporal hurt to another, as by striking at another with a stick or weapon, though the party striking misses his aim. The principle is, that it is sufficient, in order to constitute such an offense, that there has been such an exhibition of a violent and offensive *animus* as to show at once the intention, and the power, to commit it. So, drawing a sword or bayonet, or even holding up a fist in a menacing manner, throwing a bottle or glass with intent to wound or strike, presenting a gun at a person who is within the distance to which the gun will carry, pointing a pitchfork at a person who is within reach, or any other similar act, accompanied with such circumstances as denote at the time an intention, coupled with a present ability, of using actual violence against the person of another, will amount to an assault.—Russell on *Crimes and Misdemeanors*, vol. i. p. 750. It has even been laid down, that to present a pistol, purported to be loaded, so near as to produce danger to life if the pistol had gone off, is an assault in point of law, although, in fact, the pistol was not loaded.

But no *words*, however provoking or irritating, can amount to an assault. On the other hand, the injury need not be effected directly with the hand of the person making the assault. Thus, there may be an assault by encouraging a dog to bite, by riding over a person with a horse, or by wilfully and violently driving a cart, etc., against the carriage of another person. Nor is it necessary that the assault should be immediate; as where a defendant threw a lighted squib into a market-place, which, being tossed from hand to hand by different persons, at last hit the plaintiff in the face, and put out his eye, it was adjudged that this was actionable. And the same has been held where a person wantonly pushed a drunken man against another, and thereby hurt him. A defendant put some cantharides into coffee, in order that a woman might take it; and she did take it, and was made ill by it; and this was held to be an assault. It is also an assault, wilfully and of malice to expose another to the inclemency of the weather; so is the taking indecent liberties with females without their consent, although they did not actually resist; and to such indecent liberties a very wide application has been given, even to the extent of holding a medical practitioner guilty of assault, who stripped a young girl of her clothes, on the pretense that he could not otherwise judge of her illness. Not only does the

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striking that takes place at a *prize-fight* constitute an assault as between the combatants themselves, but all persons present in consent and co-operation may be punished as aiders and abetters. Again, an assault may be committed by unlawfully imprisoning or detaining the person of another; and by such detention is meant every confinement of the person, whether it be in a common prison or in a private house, or by a forcible detaining in the public streets. Numerous other cases could be stated, showing how nicely and protectively the law on this subject has been elucidated; but the explanation we have given is sufficient for its popular illustration.

Generally, it may be laid down, that the essential thing is the *intention* with which the alleged act is done, so that no matter how violent or menacing the conduct of the accused may have appeared to be, nor even how serious the injury, if it can be shown that the whole was unintentional or accidental and undesigned, there is no assault.

It is a good defense to prove that the alleged battery happened by accident, or that it was not in anger, or that it was merely the correction which a parent or master is entitled to use to a child, or scholar, or servant, or that it was done in self-defense, or in defense of a wife, a husband, a parent, a child, a master, or a servant; or that it was such personal force as a proper officer was entitled to employ.

With respect to *aggravated* assaults, their special character arises from the great criminality of the object intended to be effected. Thus, attempts to murder, or to do great bodily harm, to ravish, and to obstruct officers of the law in the execution of legal process, are all of the nature of aggravated assaults; as are also attempts to commit robbery, or any other felony. The success of the attempt is not a feature of the case; such an attempt involving violence constitutes an aggravated assault.

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ASSAY, v. *ăs-sā'* [F. *essayer*, to try: *essai*, a trial—from mid. L. *exāgium:* Gr. *exāgion*, a weighing, a trial]: to prove by examination; to try or prove, as metals; to attempt; to endeavor: N. examination; trial, as of the purity of silver or gold; tested value. ASSAY'ING, imp. ASSAYED, pp. *ăs-sād'*. ASSAY'ER, n. one who.

ASSAY, or ASSAYING: process employed in determining the proportion of pure metal in a metallic ore or in an alloy. This method of analysis is more generally followed in the examination of compounds of silver and gold, but is resorted to likewise in the investigation of ores of iron, copper, tin, zinc, bismuth, antimony, mercury, and lead. In manufactured articles, also, such as silver-plate, and gold-plate, some foreign metal (usually copper) is present, to impart hardness to the metal; and in Great Britain, each article is assayed at the Goldsmiths' Hall, previously to being sold, so as to determine the exact richness of the metal whereof it is made. In the A. of compounds containing silver, the apparatus employed is a *cupel*—a small

Cupel.

basin-shaped vessel of the form and size of the figure, made of bone-ash; and a *muffle*, composed of fire-clay, about eight inches in length and three to four inches in diameter, shaped like a miniature railway tunnel, open at

Muffle.

the one end, A, closed at the other end, B, and having numerous slits or air-holes, C, along the side. The more simple A. of silver consists in the examination of argentiferous lead ore. By a preliminary process, the sulphur is separated (see LEAD); and weighed fragments of the mixed lead and silver being placed on cupels, the latter are introduced into the muffle, which has been previously heated in a furnace, where it still remains. The fire is then increased, and air being admitted to the muffle, the oxygen of the air unites with the lead, forming oxide of lead (PbO), which in part volatilizes through the openings in the side of the muffle, and in other part sinks into the porous bone-earth of which the cupel is made. While the lead is thus carried away, the silver remains behind as a molten metallic globule, and when the last traces of lead-fumes leave the silver bead, the latter suddenly *lightens*, and immediately thereafter becomes brilliant and

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white. On being slowly allowed to cool, the globule of silver may be weighed, and the amount of pure metal thus determined. The use of the cupel during this process has led to the term *cupellation* being employed in place of A. When silver contains copper, which it does in ordinary coinage and silver-plate, it becomes necessary to mix lead with the alloy before attempting to separate the copper. The manner in which the lead is generally added is to roll the alloy of silver and copper in a piece of sheet-lead or lead-foil, and place the whole package on the cupel. During the heating in the muffle, the lead oxidizes as usual, and in part passing into the bone-earth of the cupel, carries the copper with it. The amount of lead required to effect the separation of copper from silver in this way is given in the following table:

Standard of Silver in One Part.	Amount of Copper Alloy in One Part.	Quantity of Lead necessary for One Part of Alloy.	Quantity of Lead in relation to that of Copper.
1,000	0	$\frac{2}{10}$ part.	
950	50	3 parts.	60 to 1
900	100	7 "	70 " 1
800	200	10 "	50 " 1
700	300	12 "	40 " 1
600	400	14 "	35 " 1
500	500	16 to 17 "	32 " 1
400	600	16 " 17 "	27 " 1
300	700	16 " 17 "	23 " 1
200	800	16 " 17 "	20 " 1
100	900	16 " 17 "	18 " 1
Pure copper.	1,000	16 " 17 "	16 " 1

The metallurgic chemist, while performing an A., can determine, by the examination of the stains on the cupel after the process has been finished, what metal may have accompanied, and been separated from, the silver, even in minute quantity. Thus, lead alone imparts a straw-yellow or orange stain; copper a gray or dark-brown tint; and iron, a black stain.

During the A. of silver by the foregoing or *dry* method, a certain loss of metal usually occurs, which averages 2 parts in 1,000; and this has induced the authorities in the mints of Great Britain, France, and other European kingdoms, and of the United States, to adopt a *humid* process for the A. of silver, which will determine the value of a silver alloy to within 0·5 (or half a part) in 1,000. The humid or wet A. consists in dissolving the compound of silver in nitric acid of density 1·25, and thereafter adding a solution of common salt (chloride of sodium, NaCl), which causes the precipitation of the chloride of silver (AgCl) in white flocculi. The common salt is made of a definite strength, and is poured out of a measured or graduated vessel, till all further precipitation of the silver ceases, when the amount required of the solution of common salt is read off, and by a simple calculation its equivalent in pure silver is obtained.

The A. of gold ores is conducted in a manner similar to that of silver When the ore contains gold, lead, and cop-

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per only, it suffices to mix more lead with it, and heat in the cupel in the muffle furnace, when the lead and copper sink into the cupel, and the gold forms a globule on the upper surface. The proportion of lead required is regulated by the amount of copper present in the alloy.

Proportion of Gold contained in One Part of the Alloy.	Quantity of Lead necessary to completely remove the Copper by Cupellation.
1,000 thousands	1 part.
900 "	10 parts.
800 "	16 "
700 "	22 "
600 "	24 "
500 "	26 "
400 " and under.	34 "

When the gold is accompanied by silver as well as copper, iron, and lead, it is necessary in the first place to subject the alloy to the A. process in the ordinary way, which rids it of the copper, iron, and lead, but leaves the silver still incorporated with the gold. The weight of this residual button gives the combined weights of the silver and gold present in the alloy. The method of separating the silver from the gold is called *parting*, and consists essentially in acting on the alloy with hot nitric acid, which dissolves away the silver, forming the soluble nitrate of silver, $AgNO_3$, and leaves the gold undissolved. When the silver is present in small proportion, the gold assumes a protective influence, and keeps the nitric acid from acting on the silver; and to effect this separation satisfactorily, it is necessary that there should be about three parts of silver to one of gold. As that proportion does not occur naturally, or in any kind of manufactured gold-plate, it is requisite to incorporate some silver with it. This is generally accomplished by taking the proper quantities of gold and silver, wrapping them up in a piece of lead-foil, and heating on a cupel. The lead, during its disappearance from the heating vessel, causes the most intimate amalgamation of the silver and gold, which are left on the cupel as a metallic button. The latter, on being allowed to cool, is beaten out on an anvil with a smooth hammer, and is then passed through steel rollers, which yield a ribbon of alloy about the thickness of an enamelled address-card. The ribbon of metal being coiled up, is technically called a *cornet*, and when introduced into the flask with nitric acid, the entire solution of the silver is accomplished, while the gold is left as a brown-colored spongy mass, of the shape and size of the cornet. To give the metal the appearance and compactness of ordinary gold, the very friable metallic ribbon is gently transferred from the *parting glass* to a crucible by inverting the former into the latter; and the liquid which runs in with the gold being poured off, the crucible and its contents are raised to a red heat in a furnace, when the gold recovers its beautiful yellow color and metallic lustre, and at the same time becomes soft and flexible. The gold is now pure, and in a fit condition to be weighed, and the amount ob-

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tained indicates the proportion of pure gold in the original alloy. As the quantity of silver which is required to be present during this process, in order that the *parting* by nitric acid may readily take place, is three parts of silver to one of gold, it is customary to call this department of a gold A. *quartation*, or *inquartation*.

During the A. of silver or of gold, it is necessary to guard against any sudden increase or decrease in temperature. Independently of the probable loss of metal through the fracture of the cupels, it is found that when the final buttons of pure metal are obtained on the red-hot cupel, if great care be not taken to cool the whole very slowly, the bead of gold or silver *spits*, and little portions are thrown off. See ALLOY (in Chemistry): ALLOY (in Law): MINT (United States): also HALL (HALL-MARK): GOLDSMITHS' COMPANY: PLATE-MARKS.

The mode of assaying gold above described often is not applicable for examination of jewelry and other manufactured articles, as removal of even a few grains might be the destruction of the article, and in such circumstances the *touchstone* is resorted to This stone was originally brought from Lydia in Asia Minor, and consisted of a coarse-grained quartz saturated with bituminous matter, but black basalt and other stones are now employed for the same purpose. The manner of using the stone is to draw a streak upon it with the auriferous article; and from the color of the streak the richness of the gold can be very accurately determined by the practiced assayer. The subsequent action of nitric acid on the golden streak serves still further as a means of determining the purity of the metal, as the acid readily dissolves the copper and silver, and leaves the gold. See Mitchell's *Manual of Practical Assaying* (5th ed., by Crookes, 1881).

ASSAYE, *ăs-sī'*: t. in the n.e. of the nizam's dominions, at the fork of the Juah and Kaitna; noticeable as the scene of the first great victory of the Duke of Wellington, then Maj.gen. Wellesley, 1803, Sep. 23. The British troops in action were only abt. 4,500, while the Mahrattas under Scindia and the rajah of Berar numbered 50,000, of whom 10,000 were commanded by French officers. Cannon numbering 98, 7 standards, all the baggage, and a large part of the ammunition of the Mahrattas fell into the hands of the conquerors, whose military supremacy was soon acknowledged over a great portion of India. In 1851, a medal was struck in commemoration of the victory.

ASSEERGHUR, *a'sēr-gŭr'*: fort on an isolated mountain at the n.e. angle of the presidency of Bombay, lat. 21° 26′ n., long. 76° 26′ e.; elevation above the base of the mountain, estimated 750 ft. Its extreme length and breadth are respectively 1,100 and 600 yds.; from the irregularity, however, of the outline, the area is computed at not more than 300,000 sq yds., or somewhat less than $\frac{1}{10}$th of a sq. m. With the exception of two avenues of ascent, both of them difficult and strongly fortified, the space is everywhere terminated by a carefully scarped precipice, varying in height from 80 to 100 ft. This formidable fastness has been twice taken by the British—in 1803 and 1819.

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ASSEGAI, n. *ăs'sĕ-gā*, or ASSAGAY, or ASSAGAI, n. *ăs'ā-gā* [Sp. *azagaya*, a spear or half-pike]: a dart or javelin used by the Kafirs, etc.: V. to pierce or kill with an assegai. AS'SEGAYING, imp. ASSEGAIED, pp. *ăs'ĕ-gād*.

ASSEMBLE, v. *ăs-sĕm'bl* [F. *assembler*, to gather, to assemble—from mid. L. *assimŭlārĕ*, to bring together into one place—from L. *ad*, *simul*, together: AS. *samod*, together]: to gather a number of persons or things together; to meet together. ASSEM'BLING, imp. ASSEMBLED, pp. *ăs-sĕm'bld*. ASSEM'BLER, n. *-blĕr*, one who. ASSEMBLAGE, n. *ăs-sĕm'-blāj*, a mass of persons; a collection of particulars. ASSEMBLY, n. *ăs-sĕm'blĭ*, a number of persons met in the same place for a common object; a congregation; a convocation. GEN'ERAL ASSEM'BLY, the highest ecclesiastical court in the Established and Free churches of Scotland, and in the Presb. churches in Ireland and in the United States.—SYN. of 'assemble': to muster; collect; convene; convoke;—of 'assembly': assemblage; group; collection; company; meeting; congregation; parliament; diet; congress; convention; synod; convocation; council.

ASSEM'BLY [*assemblée*]: in the conduct of an army, the second beating of the drum before a march, at which the soldiers strike their tents if encamped, roll them up, and stand to arms.

ASSEM'BLY, GENERAL: in Scotland, Ireland, and the United States, denotes the highest court of the Presb. Church. It differs from the Anglican Convocation in its constitution and in its powers, representing as it does both the lay and the clerical elements in the church, and possessing supreme legislative and judicial authority in all matters purely ecclesiastical. The General A. of the Established Church of Scotland consists of representatives, clerical and lay, from all the presbyteries of the church. The royal burghs of Scotland also return elders to the General A. of the Established Church, and each of the Scottish universities sends a representative. The Assembly meets once a year, in the middle of May, at Edinburgh, and sits for ten days Its deliberations are presided over by a moderator, whose election is the first step in the proceedings, after a sermon by his predecessor. In former times this office was filled sometimes by laymen: among others, in 1567, by George Buchanan. In modern times, the moderator is always a clergyman. Eighty-four presbyteries, composing 16 synods, return members to the General A. of the Established Church of Scotland. Its relation to the state is represented by a royal commissioner, who exercises no function in the A. beyond that of adding by his presence the sanction of the civil authority to its proceedings. The other functionaries are a principal and a deputy clerk, both clergymen, a procurator, and an agent. All business not despatched during the session of the A. is referred to a commission, with the moderator as convener, which meets immediately after the dissolution of the A., and again quarterly. The General Assembly of the Free Church of Scotland, which has 16 synods comprising 73 presbyteries, and the General

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Assembly of the Irish Presb. Church, are similarly constituted, the principal difference being the absence of the royal commissioner. In the United States, the General Assemblies of the Presb. Church, of the Presb. Church South (a secession from the former), of the Cumberland Presb. Church, and of the United Presb. Church, are constituted on the same general model with some differences in detail. The General Assembly of the Presb. Church in the United States has now become a very large body, as it is formed of delegates from the presbyteries in the proportion of one delegate to every 24 members of those bodies. See PRESBYTERY: SYNOD: BARRIER ACT: etc.

ASSEM'BLY, NATIONAL (France): title assumed by the commons of the states-general (q.v.), convoked by Louis XVI. of France, and opened 1789, May 5. The states-general consisted of two privileged orders, clergy and nobles, and of the *tiers-état* or commons. The privileged orders refused to join the third estate and deliberate in a common chamber, and the latter, of its own authority, June 17, assumed the title of *Assemblée Nationale*, and the right to act in the name of France. The court attempted to annul this resolution in a royal sitting, June 23; but the deputies of the third estate, along with the liberal members of the other two orders, had bound themselves by oath not to separate until they had given France a constitution, and had declared every attempt at violence on the part of the court, treason. They refused to quit the common hall, and the court yielded, and commanded the nobles and clergy to join the National A. This was the beginning of the revolution, and the A. proceeded with astounding rapidity to metamorphose old France. The abolition of all privileges, Aug. 4, was followed by abolition of hereditary jurisdiction, and of restraints on religion and the press, and by the declaration of the Rights of Man (q.v.). In 1790, Feb., the monastic orders were suppressed, and all remnants of feudalism swept away; in March, *lettres de cachet* and the oppressive salt-tax were abolished; in June, all orders and titles of nobility. In July, non-Catholics had the property confiscated from their ancestors restored; Jews were relieved from personal taxation; and game-laws done away. A decree of Oct. 18 abolished the cruel criminal penalties of Louis XIV. In 1791, Jan., all corporations and guilds were abolished, and free-trade introduced. In Feb., political rights were conceded to Quakers; in May, the customs at city gates were abolished; in June, the torture; the violation of the secrecy of letters was also declared criminal. In Sep., all citizens, of whatever color or religion, received political rights.

The principles on which the Assembly proceeded were the sovereignty of the people, the independence of the communes, the limitation of the royal power through a conditional veto (q.v.), the separation of the political authorities, and the responsibility of ministers. Accordingly, the A., shortly after it was constituted, declared that to it alone, subject to the royal veto, belonged the legislative power. Several decrees, 1789, Sep., determined that the legislative body should form only one chamber, and should be renewed

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every two years; other decrees declared the king inviolable, and the throne inalienable. A decree of Nov. 7 forbade the deputies to undertake the place of ministers; in Dec., the new organization of the communes was begun. In 1790, Jan., France was divided into departments; in April, trial by jury was introduced; in May, it was declared that the right of war and peace belonged to the nation alone, that is, to the A.

In regard to finance, which had been the immediate cause of the Assembly's being convoked, the reforms were equally thorough. It was decreed at the outset that taxes were to be apportioned and raised without regard to rank or person. Then followed the approval of a loan of 80 millions of francs. A decree of 1789, Nov., ordered the publication of the public accounts; another in Dec. established a national bank. In 1790, March, appeared the first law sanctioning the sale of 400 million francs' worth of the national domains; and in April, another ordering the issue of *assignats* (q.v.) on the national property; in Oct., these assignats were declared to bear no interest. These measures were followed, in the beginning of 1791, by a series of laws regarding coining, taxation, encouragement to industry, revenue management, etc. A committee of the A. appointed to reform church matters, made a complete overturn of the old ecclesiastical system. After a declaration that Roman Catholicism had ceased to be the state religion, tithes were abolished, and church property confiscated. Church ornaments and valuables were appropriated as patriotic gifts to the state; the civil jurisdiction of the bishops was taken away, and monks and nuns were freed from their vows. The clergy was put under a civil constitution. Each department was a see, and the communes ruled and paid bishop and curés. All the clergy were amenable to the civil courts, without appeal to the pope or the interference of any ecclesiastical authority whatever. Every clergyman had to take an oath accepting this constitution, which led to the emigration of a number, and subsequently to enactments of excessive rigor against refractory priests (*prêtres insermentés*).

The A. having thus laid the revolution on a foundation of 3,250 decrees, and having sworn to the new constitution, and secured its acceptance by the king, closed its sittings, 1791, Sep. 30. From its having framed the constitution (which lasted only 12 months), this assembly is usually called the Constituent A. It made way for the LEGISLATIVE ASSEMBLY, which was to reform the civil and criminal laws in accordance with the spirit of the new constitution. A decree had provided that no member of the Constituent should be returned to the Legislative A. But the democratic party received such preponderance at the elections, that the A. forgot its mission from the very first, and commenced a war with the remnants of the royal authority, which ended, 1792, Aug. 10, with the overthrow of the throne and the suspension of the king. The constitution had provided for an appeal to the nation in extreme cases, and the Legislative A. now exercised that right by con-

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voking a *National Convention* (q.v.), which, being invested with the powers of the sovereign, was to decide on the fate of the monarchy, and remodel the whole political system.

The title of National A. has been assumed by various other parliamentary bodies, originating in popular commotions, and aiming at radical political changes; as the French A. that met after the revolution of 1848, Feb., which was followed 1849, Apr., by a Legislative A.; the German National A. at Frankfort; and the Prussian National A. Under the existing French republic, the senate and the chamber of deputies united form the National A.

ASSEM'BLY OF DIVINES', or WEST'MINSTER ASSEM'BLY: a convocation appointed by the Long Parliament for settling the doctrine, liturgy, and government of the Church of England. It consisted of 120 clergymen and 30 laymen—10 of whom were lords and 20 commoners—together with 4 clerical and 2 lay commissioners from the Church of Scotland. Among the more distinguished of the divines were Usher, Saunderson, Reynolds, Brownrigg, Ward, Twisse, Lightfoot, Gataker, Burges, Goodwin, Calamy, and Nye; of the laymen, Selden, Prideaux, the two Vanes, Rouse, Pym, Whitelocke, St. John, and Maynard. The Scottish divines were Henderson, Gillespie, Rutherford, and Baillie. Twenty-five of those whose names were contained in the ordinance calling the Assembly, dated 1643, June 12, never appeared at the discussions, one or two of them having died about the time of the first meeting, and the others fearing the displeasure of the king. To supply the place of these absentees, some additional members, called the superadded divines, were summoned to attend. The A. held its first meeting 1643, July 1, and continued to sit till 1649, Feb. 22, during which time it had met 1,163 times. Its most important work was concluded long before that time. One of the first things it did was to give its sanction to the *Solemn League and Covenant*, against which Dr. Burges alone stood out for several days. The Presbyterians formed a large majority in the Assembly, and exercised a corresponding influence on its decisions. In doctrine, the members were almost unanimous; but on the subject of church government, opinions extremely opposite were maintained with keenness, especially on the question touching the sphere and limits of the civil power in matters ecclesiastical. The principal fruits of its deliberations were the *Directory of Public Worship*, submitted to parliament 1644, Apr. 20; the *Confession of Faith*, 1646, Oct. and Nov.; the *Shorter Catechism*, 1647, Nov. 5; and the *Larger Catechism* 1648, Sep. 15. These several formularies, which contain a clear and rigid embodiment of Calvinistic theology and Presbyterian church government, constitute to this day the authorized standards of the Presbyterian churches of Scotland, Ireland, England, and the United States. The *Directory of Public Worship* was ratified by both houses of parliament, 1644, Oct. 2, and the doctrinal part of the *Confession of Faith* 1648, March. An order of the house of commons, 1647, Oct. 13. ordained that the Presbyterian

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form of church government should be tried for a year, but no further legislation followed. What has hitherto been known as to the details of the proceedings of this convocation has been derived chiefly from the *Letters* of Baillie, and Lightfoot's *Journal*.—See Hetherington's *History of the Westminster Assembly* (1843); and the 2d vol. of Masson's *Life of Milton*, published in 1871 (pp. 509–527), where a list of the members, with brief biographic notices, is given. See CREEDS AND CONFESSIONS.

ASSENT, v. *ăs-sĕnt'* [OF. *assentir*, to assent, to consent —from L. *assentiō*, I assent—from *ad*, to; *sentiō*, I think]: to think in accordance with some one; to admit as true; to yield; to agree: N. act of admitting or agreeing to; consent. ASSENT'ING, imp. ASSENT'ED, pp. ASSENT'ER, one who. ASSENTATION, n. *ăs-sĕn-tā'shŭn*, hypocritical assent to everything which another says; pretended concurrence in every opinion, however absurd, which he broaches. ASSENTIENT, a. *ăs-sĕn'shĭ-ĕnt*, assenting to, as opposed to *dissentient*. ASSENT'IVE, a. *-ĭv*, assenting. ASSENT'INGLY, ad. *-lĭ*.—SYN. of 'assent, v.': to accede; yield; acquiesce; consent; accord; agree; concur; coincide; comply; conform; submit; concede; approve.

ASSENT' RO'YAL: see PARLIAMENT.

ASSER, n. *ăs'sĕr* [L. *asser*, a small beam or lath]: in *arch.*, a thin rafter, board, or lath.

ASSER, *ăs'ĕr*, JOHN: d. 910: biographer of Alfred the Great. The *Saxon Chronicle* records some events of his career. He was a monk of St. Davids, from the Latin name of which, *Menevia*, he is termed in the old records *Asserius Menevensis*. About 885, his reputation for learning and piety procured him an invitation to the court of Alfred, where he resided at intervals during the rest of the king's life, assisting him in his studies, and receiving his affectionate confidence, of which he seems to have been every way worthy. The king promoted him to various dignities, and finally made him Bishop of Sherborne. Several works have, with more or less authority, been attributed to A. The only one undoubtedly his is *Annales Rerum Gestarum Aelfredi Magni*. This simple and most interesting narrative was first pub. 1574 by Abp. Parker. Its trustworthiness was questioned (1842) by Thomas Wright, in the article 'Asser' of his *Biographia Britannica Litteraria*. Lingard and Dr. Pauli have replied; and the prevailing impression of scholars in Anglo-Saxon literature is that there is no reason for doubting its general accuracy. The best ed. is that of Wise (Oxf. 8vo. 1722).

ASSERT, v. *ăs-sĕrt'* [OF. *asserteur*, to assert: L. *assertus*, bound or fastened to one's-self—*lit.*, to join or fasten to]: to affirm positively; to maintain. ASSERT'ING, imp. ASSERT'ED, pp. ASSERTION, n. *ăs-sĕr'shŭn* [F. *assertion*—from L. *assertiōnem*]: the act of asserting; an affirmation. ASSERTIVE, a. *ăs-sĕr'tĭv*, that affirms positively. ASSERTIVELY, ad. *-lĭ*. ASSERT'ORY, a. involving an assertion; designed to support an assertion. ASSERT'OR, n. one who.

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—SYN. of 'assert': to affirm; asseverate; aver; protest; maintain; pronounce; declare; vindicate.

ASSES, FEAST OF: see FOOLS, FEAST OF.

ASSESS, v. *ăs-sĕs'* [OF. *assesser*, to assess—from L. *assessus*, sat down—from *ad*, to; *sessus*, sat or remained, set]: to set or fix a rate to be paid; to value; to rate. ASSES'SING, imp. ASSESSED, pp. *ăs-sĕst'*. ASSES'SABLE, a. *-sĕ-bl*, that may or ought to be assessed. ASSES'SABLY, ad. *-blĭ*. ASSESS'MENT, n. the amount of a tax laid on a property. See TAX—TAXATION. ASSES'SOR, n. *-sĕr* [F. *assesseur*, an assessor—from L. *assessōrem*]: one who sits by a judge or an arbiter as a legal adviser or as a helper: in *OE.*, one next in dignity; one authorized to fix the value of taxes. ASSESSORIAL, a. *ăs'sĕs-sō'rĭ-ăl*, or ASSESSIONARY, a. *ăs-sĕsh'ŏn-ĕr'ĭ*, pertaining to an assessor.

ASSESSION, n. *ăs-sĕs'shŭn* [L. *assessio*—from *ad*, to; *sessio*, a sitting]: a sitting near one to give one counsel. ASSES'SIONARY, a. pertaining to assession.

ASSETS, n. plu. *ăs'sĕts*, or ASSET, n. sing. *ăs'sĕt* [OE. *asseth:* Scot. *assyth*, compensation, satisfaction: L. *ad*, for; *satis*, enough: F. *assez*, enough: Ger. *satt*, satisfied—*lit.*, up to what is enough]: funds or property available for payment of debts, etc. In strictness the term is not applicable to the property of a person who dies intestate, and without any debts to be paid. In general acceptation, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or to a trading association.

A. are either *personal* or *real*, the former comprehending such goods, chattels, and debts as devolve on the executor; and the latter including all real estate, whether devised or descending to the heir at law. In connection with this distinction, A. are also said to be *A. by descent*, and *A. in hand*, the former of these being recoverable from the heir to whom the land descends, and so far as such lands will extend—the latter signifying such property as a person leaves to his executors sufficient for the clearing of burdens and bequests affecting his personal estate. A. are also in their nature either *legal* or *equitable*, according to the nature of the remedy which may be used by creditors against the executor or heir. Where there are several creditors of equal degree, the executor is bound to pay him who first obtains judgment for his debt; and he cannot resist on the ground that nothing will be left for the other creditors. If, after exhausting the whole A. which have come to his hands, by the payment of debts in due order, he be afterwards sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he has fully administered, or technically by a plea of *plene administravit;* and upon this plea the creditor is entitled to judgment that he shall be paid out of any other A. that

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shall come to the defendants, which is called a judgment of A. *in futuro.*

ASSEVERATE, v. *ăs-sĕv'ĕr-āt* [L. *assĕverātus*, stated earnestly—from *ad*, *sĕvērus*, earnest, serious]: to assert with much earnestness; to declare positively; to affirm solemnly. ASSEV'ERA'TING, imp. ASSEV'ERA'TED, pp. ASSEVERATION, n. *ăs-sĕv'ĕr-ā'shŭn*, a positive declaration; a solemn affirmation or assertion.—SYN. of 'asseverate': to affirm; protest; declare; aver; assert.

ASSIDE'ANS: see CHASIDIM.

ASSIDENT, a. *ăs'sĭ-dĕnt* [L. *assiden'tem*, sitting by or near—from *ad*, to; *sedĕō*, I sit]: associating with or sitting by others—applied to symptoms or signs of a disease.

ASSIDUOUS, a. *ăs-sĭd'ū-ŭs* [L. *assid'ŭŭs*, sitting closely —from *ad*, *sedĕō*, I sit: F. *assidu*, assiduous—*lit.*, sitting close or near]: very attentive: careful; diligent. ASSID'UOUSLY, ad. *-lĭ*. ASSID'UOUSNESS, n. the quality of being assiduous; close diligence. ASSIDUITY, n. *ăs'sĭ-dū'ĭ-tĭ*, close application; great diligence.—SYN. of 'assiduous': diligent; active; industrious; laborious; sedulous; attentive; unwearied; indefatigable; persevering; unintermitted.

ASSIENTO, or ASIENTO, n. *ăs'ĭ-ĕn'tō* [Sp. *asiénto*, a treaty, a contract]: a contract or convention; a special treaty: specially applied to a compact between Spain and some foreign nation, according to which the Spanish government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. It was Charles I. of Spain who first concluded an A. with the Flemings. Next, a similar compact was entered into with the Genoese (1580), the Portuguese (1696), and on the accession of Philip V. to the Spanish throne in 1702, with the French Guinea company, which from that time took the name of A. company, upon the understanding that for ten years it should have the exclusive right of annually importing 4,800 negroes of both sexes to the continent and islands of Spanish America. The A. was next transferred to England at the peace of Utrecht in 1713, and made over by government to the South Sea company for 30 years, permission being also granted to the company to send yearly, during the term of contract, a ship, carrying 500 tons of goods, to these Spanish colonies. The misunderstandings that grew out of this last clause contributed not a little to the war that broke out between the two nations in 1739. At the peace of Aix-la-Chapelle in 1748, the English company having still four years to run, their rights were guaranteed to them; but they relinquished them at the Madrid Convention of 1750, upon the payment of £100,000, and the concession of certain commercial advantages.

ASSIGN, v. *ăs-sīn'* [F. *assigner*, to assign—from L. *as'signārĕ*, to mark out something, to seal—from L. *ad*, to; *signo*, I mark out]: to mark out something for bestowal; to point out; to allot to; to transfer: N. a person to whom property is transferred. ASSIGN'ING, imp. ASSIGNED, pp.

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ăs-sīnd': ADJ. that is fixed or allotted. ASSIGNER, n. *ăs-sīn'ĕr*, one who. ASSIGNOR, n. *ăs-sī-nawr'*, in *law*, one who assigns. ASSIGNABLE, a. *ăs-sīn'ā-bl*, that may be transferred; that can be allotted or specified. ASSIGNATION, n. *ăs'sĭg-nā'shŭn* [F.—L.]: a making over to; an appointment to meet, as of lovers; a designation or marking out. ASSIGNEE, n. *ăs'sĭ-nē'*, a person appointed to do something; one to whom an assignment is made. ASSIGNMENT, n. *ăs-sīn'mĕnt*, the thing assigned; the transference of some right or interest.

ASSIGN, To, in Law: to transfer or grant over to a third party a security, a right of credit, or other right, whether in possession or in reversion, granted by a party indebted or under obligation to the party assigning. The words of assignment are to *A.*, *transfer*, and *set over*, and they operate to transfer both real and personal property. See ASSIGNMENT: ASSIGNATION: ASSIGNMENT OF ERROR: BANKRUPTCY.

ASSIGNA'TION: a legal term in Scotch conveyancing. analogous to the English word Assignment (q.v.); though assignment is in Scotland the technical term for the transference of certain property, such as copyrights, patents, and registered vessels.

ASSIGNATS, n. plu. *ăs'ĭn-yăs'* [F.—(see ASSIGN)]: paper money issued by the French government during the first revolution. After appropriating to national purposes the land belonging to the church, the French national assembly (see ASSEMBLY, NATIONAL), instead of bringing it into the market at a time of insecurity, when its value was depreciated, issued bonds on the security of it, which were called *assignats*, as representing land *assigned* to the holder. This paper money consisted chiefly of notes for 100 francs (abt. $20) each, though many of them were for sums as low as ten or five francs, and even lower; and the first issue amounted to 400 million francs (abt. $80,000,000). The first A., issued in the spring of 1790, bore interest; subsequent issues did not. The facility of this plan of providing government income led to its being repeatedly resorted to as the property of wealthy emigrants—persons who abandoned their country in alarm—fell into the hands of the rulers, and was confiscated, till the amount rose to the enormous sum of 45,578 million francs, besides a great number of forged A. manufactured abroad and smuggled into the kingdom. The value of the A. naturally soon began to decline, and confidence once gone, the declension became fearful. In 1793, June, one franc in silver was worth three francs in paper; in Aug., it was worth six. The state took extreme measures to compel the acceptance of A. at their full nominal value. The effects of these were to cause the A. to flow back into the public treasury, to raise the prices of all commodities, and to make every one averse to have any dealings with the state. One of these consequences was attempted to be met by fixing a maximum of prices. But no one could compel producers and dealers to produce and sell at a loss; so that all business be-

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came disorganized. At last the value of A. came almost to nothing. Millions of individuals had suffered incalculable loss, and only a few who had bought public lands with the A. that cost them little or nothing, had enriched themselves at the expense of the community. In 1796, March, a louis d'or (24 francs) brought 7,200 francs in A. After this, they were withdrawn from the currency (1796) and redeemed at a thirtieth of their nominal value by *man-*

Fac-simile of Assignat.

dats, a new kind of paper money, which enabled the holder at once to take possession of public lands at the estimated value, while A. could only be offered at a sale. The mandats also soon fell to a seventieth of their nominal value, and were returned to government in payment of taxes or of land.

At length, in 1796, July, the system of paper-credit, so obstinately persisted in by government, and so disastrous in its results to the public, came to an end. A law was passed, declaring that every one was entitled to transact business in whatever circulating medium he pleased; that the mandats should be taken at their current value; and that the taxes be received either in coin or in mandats at that rate. The A. were executed on a coarse kind of paper, and, as will be seen by the accompanying fac-simile, the devices were so meagre as to be easily counterfeited.

ASSIGNEE IN BANKRUPTCY: see BANKRUPTCY.

ASSIGNMENT, in Law: a conveyance (usually in writing) by which one transfers to another, for a sufficient consideration, a right in expectancy, in reversion, or in possession. The common or popular meaning of this word is the

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transfer of any property, real, personal, and mixed, whether the same be in possession, or in action; the technical form being to assign, transfer, and set over; but the words grant, bargain, and sell, or any other words which will show the intent of the parties to make a complete transfer, will amount to an A. The deed by which an A. is made is also called an A. By an A. of a right all the accessories which belong to it pass with it; as, if the assignor of a bond had collateral security, or a lien on property, the collateral security and the lien will pass with the assignment of the bond. The assignment of anything carries with it all that belongs to it by right of accession; if, therefore, the thing produce interest or rent, the interest or the arrearages of the rent since the A. will belong to the assignee. There are exceptions to assignments; such as personal trusts, the duties of a guardian, the salary of a judge, the commission or pay of a public officer, the right of action for fraud, and rights *pendente lite*. The indorsement of negotiable bills effects their A. Ordinarily assignments are the resort of insolvent debtors for the protection of their creditors, and to obtain their discharge from further obligation, and such cases are regulated in the different states by special statutes. In the case of an A. of a policy of insurance, by consent of the underwriter, or by statute, the A. vests in the assignee all the rights of the assignor, exception being made where a condition to the contrary is expressed in the policy. By an A. of dower the share of a widow in her deceased husband's real-estate is set apart for her use by the heir or his guardian, or by whomsoever is in possession of the land subject to dower; or, if voluntary A. be refused, this may be enforced by direction of the court after legal proceedings.

ASSIGNMENT OF ERROR: see APPEAL: ERROR.

ASSIMILATE, v. *ăs-sĭm'ĭ-lāt* [L. *assĭmĭlātus*, assimilated—from L. *ad*, to; *simĭlis*, like: F. *assimiler*, to assimilate]: to make like; to bring to a likeness; to change into its own substance. ASSIM'ILA'TING, imp. ASSIM'ILA'TED, pp. ASSIM'ILABLE, a. *-lă-bl*, that may be assimilated. ASSIMILATIVE, a. *ăs-sĭm'ĭ-lā'tĭv*, or ASSIM'ILATOR'Y, a. *-tĕr'ĭ*, that can make into a like or similar substance. ASSIMILATION, n. *ăs-sĭm'ĭ-lā-shŭn* [F.—L.]: the process by which plants and animals convert food into the various tissues of their own proper substance. See NUTRITION. ASSIMILABIL'ITY, capability of being assimilated. ASSIM'ILATENESS, quality of being similar to; likeness.

ASSINIBOIA, *ăs-sĭn-ĭ-boy'ā:* Canadian dist., formerly a part of the Northwest Territories, but formed by an order in council in 1882. It is w. of Manitoba; is bounded on the s. by the United States frontier, w. (at 111° w.) by Alberta territory, n. (at 52° n.) by the new territory of Saskatchewan; area 89,535 sq. m.; it is intersected by the Canadian Pacific railway, by the Q'appelle, South Saskatchewan, and Souris rivers; and contains the towns of Regina (new cap. of the n.w.), Fort Pelly, and Fort Ellice. A. in general resembles Alberta (q.v.). Pop. (1891) 30,372.

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ASSINIBOINE, *ăs-sĭn'ĭ-boyn;* river of British N. America, rising in lat. 51° 40′ n., and about long. 105° e. At Winnipeg it joins the Red river (q.v.), which discharges its waters into Lake Winnipeg. At a point 140 m. from its mouth, the A. is 230 ft. broad; its course measures about 400 miles. The river gives name to a tribe of Indians.

ASSISI, *ä-sē'sē* (*Assisium*): town of Central Italy; upon a steep hill, 13 m. s.e. of Perugia. It stands in a singularly picturesque situation, and is surrounded by a wall flanked with towers, and overhung by a lofty citadel in ruins. It is the birthplace of St. Francis, who here founded the Convento Sacro, the first monastery of the Mendicant order that bears his name, a large and beautiful structure, and one of the earliest specimens of the Gothic style of architecture in Italy. The church and the galleries of the monastery contain fine paintings by Cimabue, Giotto, and other old masters. Besides the Convento Sacro, there are eleven other monasteries in A. Of these, the largest is the Portiuncula, which has a richly decorated church, with a cupola by Vignola. In the last century, this place was a great resort of pilgrims, visiting the tomb of the saint, of whom one hundred thousand are said to have been assembled here on one day.

A. occupies the site of the ancient Assisium, a municipal town of Umbria, and presents the remains of the forum, the baths, and the aqueducts of the days of the Romans. In the piazza, or square, there stands a beautiful portico of the ancient temple of Minerva, consisting of fluted Corinthian columns and a pediment. There is abundance of olive-trees, and some fine mineral springs in the vicinity. The town has given title to a bishop since 240. It has manufactures of needles and files. Pop. 3,700.

ASSIST, v. *ăs-sĭst'* [F. *assister*, to assist—from L. *assĭstĕrĕ*, to stand by one—from *ad*, to; *sisto*, I am made to stand]: to stand by one as counsel before a tribunal; to help; to relieve; to aid; to succor. ASSIST'ING, imp. ASSISTED, pp. ASSISTANCE, n. *ăs-sĭs'tăns* [F.]: help; succor; aid. ASSIS'TANT, or ASSIS'TER, a. helping; lending aid: N. one who helps or lends aid.—SYN. of 'assist': to help; aid; succor; relieve; second; back; support; favor; benefit; sustain; befriend; further.

ASSIZE, n. *ăs-sīz'*, plu. ASSIZES, *ăs-sī'zĕz* [OF. *assise*, a set rate, a tax, an assembly of judges: It. *assisa*, settled pattern of dress: L. *assessĭō*, a sitting—from *ad*, to; *sessus*, sat]: a session or sitting as of a court of justice; the set day on which a court is to be held; in *plu.*, a court of justice in England held two or three times a year in a county or circuit; *sing.*, in *OE.*, a statute regulating the measure and price of commodities. ASSIZE, v. to fix measures or rates; to settle. ASSIZ'ING, imp. ASSIZED, pp. *ăs-sīzd'*. ASSI'ZER, n. *-zĕr*, one who. ASSIZE OF BREAD, in *OE.*, the settled rate for the sale of bread.

ASSIZE: a word literally signifying a 'sitting' or 'session': used in the principal European legal systems, and

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very much in the same sense, or rather senses, in all, for it has more than one distinctive meaning. As is common with regard to most of the ancient British legal technicality, the Latin language, in the first instance (*assideo*), and then the French (*assis*), appear to have led to its introduction into the phraseology of the law of England and Scotland. In England the word may signify a jury (as in Scotland), and it is sometimes used to denote an ordinance, decree, or law. But in modern practice, it is commonly applied to the sessions or sittings of the judges of the superior law-courts, held periodically in each county, for administering civil and criminal justice. These courts came into use instead of ancient justices in eyre, *justicia rei in itinere*. They are now appointed by commissions issued twice a year to the judges of the high court of justice, two judges being generally assigned to each circuit. The circuits are, since 1875, seven in number—Northern, Northeastern, Midland, Southeastern, Oxford, Western, and North and South Wales; and in going them, the judges or commissioners sit by virtue of four several authorities: 1. The commission of the *peace;* 2. A commission of *oyer* and *terminer;* 3. A commission of general *jail* delivery. The other authority is, 4. That of *nisi prius*, which is a consequence of the ancient commission of A. being annexed to the office of justices of A. by the statute of Westminster the second. The circuit system does not extend to London and Middlesex, which have instead courts of *nisi prius*, which are held before the chief or other judge of the superior courts for the trial of civil causes, at what are called the London and Westminster sittings; these districts have also the central criminal court, with its enlarged jurisdiction.

The circuit courts of Justiciary in Scotland, of which there are three—the north, the west, and the south—resemble the assizes in England; but in civil causes their authority is very limited.

In the sense of an ordinance or law, the term A. has various applications, although chiefly in the more ancient systems of jurisprudence. Thus, the 'Assizes' of Jerusalem were, according to Gibbon's *Decline and Fall* (vol. xi. p. 93), a code of feudal laws for the kingdom of Jerusalem, formed 1099 by an assembly of the Latin barons and of the clergy and laity under Godfrey of Bouillon. There were also the 'Assizes' or ordinances regulating the price of bread, ale, fuel, and other common necessaries of life, all of which ordinances have been abolished. See COURTS: JUDGE: JUDICIARY: JURY TRIAL: FAIRS.

ASSOCIATE, v. *ăs-sō'shĭ-āt* [L. *associātus*, associated, united—from L. *ad*, to; *socĭo*, I join; *socĭus*, a companion: F. *associer*]: to make one person a companion to another; to join in company as a friend or companion: N. a companion; a partner. ASSO'CIA'TING, imp. ASSO'CIA'TED, pp. ASSOCIATION, n. *ăs-sō'shĭ ā'shŭn* [F.—L.]: the union of persons in a company, usually for mutual benefit; a society; connection, applied to ideas. ASSO'CIA'TIVE, a. *-tĭv*, having the quality of association. ASSO'CIA'TOR, n. one who.

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ASSO'CIABLE, a. *-ă-bl*, companionable. ASSO'CIABLENESS, n., or ASSO'CIABIL'ITY, n. *-bil'i-ti*, the quality of being companionable. ASSO'CIATESHIP, n. the state or office of an associate. ASSO'CIA'TIONAL, a. *-shi-ă'shun-ăl*, pertaining to. ASSOCIATION OF IDEAS, the process by which one idea when excited presents to the mind contiguous or similar ideas.—SYN. of 'associate, n.': companion; comrade; colleague; mate; partner; fellow; friend; ally; coadjutor;—of 'association': partnership; alliance; combination; society; company.

ASSOCIATED PRESS: close corporation organized for collection and distribution of news for use of the journals who acquire membership in it (said to be worth $250,000), formed in New York 1849. It includes the New York *Herald*, *Tribune*, *Times*, *World*, *Journal*, *Evening Post*, *Commercial Advertiser* (evening edition), *Journal of Commerce*, and *Mail and Express*. The Associated Press has agents in every principal part of the world, who send local news to its nearest headquarters, whence it is forwarded to the main office in New York. Thence it is distributed to the local members by pneumatic tube (being manifolded), and to the country press by telegraph. The papers of the country press, and newspapers not members, are given the facilities of the Associated Press by purchasing the news, at a regular rate per week, and at a price agreed upon, which is fixed in accordance with the amount of news taken. No member of the Associated Press can sell out, nor can any new member be admitted without the consent of all the rest.

Europe, Asia, and the Colonies are supplied with news by Reuter's Telegram Company, founded in Europe by Baron Jules Reuter about the same time as the Associated Press. There is also in London the Central News Agency, a rival of Reuter's, though confining itself more particularly to the collection and distribution of British news. The New York City Press Association is attached to the Associated Press, and collects local news (covering New York, Long Island, Westchester County and Staten Island), which is distributed locally by its own messengers, and elsewhere by the Associated Press through the telegraph.

ASSOCIATE PRESBYTERIAN CHURCH, in the United States: see UNITED PRESBYTERIAN CHURCH OF NORTH AMERICA: PRESBYTERIAN CHURCH IN THE UNITED STATES.

ASSOCIATE REFORMED PRESBYTERIAN CHURCH: see UNITED PRESBYTERIAN CHURCH OF NORTH AMERICA.

ASSOCIATE SYNOD—ASSOCIATE PRESBYTERY, etc.: designations adopted among the dissenters from the Church of Scotland. See SCOTLAND, CHURCH OF: UNITED PRESBYTERIAN CHURCH. In the United States also there are an Associate Synod and an Associate Reformed Church, offspring of the Scottish Secession.

ASSOCIA'TION: see CO-OPERATION: LEAGUE: COMPANY: SOCIETIES.

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ASSOCIA'TION OF IDE'AS: the process by which an idea calls up, or is called up by, other ideas. This is an important department in the Philosophy of the Human Mind, as it relates to a pervading fact at the foundation of our intelligence. An exposition of this subject supplies an exposition of a number of the complex phenomena of mind more satisfactory than if those phenomena were treated separately. What is meant by A. is familiarly illustrated by such occurrences as the following: When we see the sky becoming overcast, we think of rain as about to follow, the notion of rain not having previously been present to our mind. When we hear the church-bells, we are apt to think of the throngs in the street, or of some of the other circumstances of public worship. When we pass a house, we are reminded of its occupant; and meeting a person we know, we may be carried in thought to his office, and from that to other persons holding the same office, and so on. If an object is before a person's eyes, as a mountain, he is said to receive an impression or sensation of it, in consequence of the actual presence of the thing; but it is possible for him to remember the mountain, or to have an idea of it, when far away from the reality, in which case there must be some power in the mind itself, different from the susceptibility to objects present, a power of retaining, reviving, or resuscitating those states at first induced by contact with the actual. Besides the sights, and sounds, and touches caused by contact with real things, we are greatly occupied with sights, sounds, and touches remembered, anticipated, or imagined, which is to live in a world of ideas; and it is in this world that the process termed Association has its sphere. When an idea is brought before the mind without its original, as when one pictures to his mind the late Duke of Wellington, the circumstance is owing to the mention of his name, or of some incident connected with him; and the remembrance of his personal appearance, as he may have been seen when alive, is said to be the result of an association existing in my mind between two ideas, so that the one is able to recall or restore the other. The association between names and things comprehends one of the most extensive applications of the power in question.

The circumstances under which one idea brings forward another into the view are principally these two—viz., first, previous *proximity;* and second, *likeness*. The terms 'Contiguity' and 'Similarity' are used in Mental Philosophy to express them. The first is exemplified in the examples of association given above; for in most of those it will be found that the conjoined notions have been frequently in the view at the same time, in consequence of which they have, as it were, grown together, or become part of the same whole. Thus, we have often noticed the darkened sky followed by a shower; the two facts have occupied the attention simultaneously, and in virtue of some power belonging to our mental framework, they have cohered into an inseparable couple or aggregate in the mind. This is proximity, or contiguity. When one

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idea suggests another which was never in company with it before, it is generally through the force of some *likeness* between the two. I meet an old man in the street with a very peculiar face, which reminds me of the bust of Socrates. These two things had never accompanied one another in my mind before, and therefore it could not be the force of proximity that made the second to arise at the instigation of the first; but there was a certain amount of likeness or similarity between the old man's features and the features of Socrates, as represented in the bust; and it is a fact of man's mental constitution, no less certain and no less important than the foregoing, that in cases where something now before the mind has a strong cast of resemblance to something formerly observed or conceived, but not at present thought of in any way, the present is apt to recall that past idea, whatever it may be. By the force of likeness, the traveller in new countries is constantly reminded of the scenes and objects familiar to him, and so is induced to draw comparisons between the one and the other. Identification and comparison both imply that things are brought together by virtue of their similarity, they not having been in company before. The principle of proximity operates most in Memory, Habit, and Routine; similarity has to do with invention and originality, and is essential to the processes of Reason and Imagination.

Law of Contiguity.—The principle of association by proximity is not confined to ideas. We must state it in a more comprehensive form, in order to comprise the full sphere of its application; for our mechanical habits are formed through the very same power of our constitution that enables us to recall or remember ideas. The taught movements of a soldier or of a skilled workman are connected together so firmly that one succeeds to another almost of its own accord. Everything of the nature of acquisition supposes a plastic property in the human system, giving permanent coherence to acts that have been performed together.

The following is a general statement of the law under consideration:

Actions, Sensations, States of Feeling, and Ideas, occurring together, or in close succession, tend to grow together, or cohere in such a way that when any one of them is afterwards presented to the mind, the others are apt to arise.

And first, as to association of Actions, or voluntary movements. When we perform a train of movements without any further aid of the will than to commence the series, there must be a fixed connection between each and the one that follows, and this connection may be either instinctive or acquired. There are various cases of instinctive trains, such as the action of the heart, lungs, and intestines, and the movements of deglutition. When a morsel of food reaches the back part of the mouth, the muscles of the throat seize hold of it, and transmit it to the stomach, independent of our will. The connected movements in this case are provided for in the original structure of the nervous and muscular system. In walking there is partly

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an instinctive tendency to alternate the limbs, and partly a confirming acquisition, the result of practice. But in those complicated operations that human beings are taught to execute in the various avocations of life, the associating principle is everything. The apparently simple and easy act of taking food is a complicated acquisition; in other words, an extensive group of associated movements. The seizing of the morsel is followed by the movement of the arm that carries it to the mouth; the mouth is opened simultaneously; after which follow the processes of biting and chewing; all which take place with the certainty of a machine, and without effort or attention directed to them. These associations were originally built up by slow degrees. 'As a general rule, it takes many repetitions to cement so firm a union between successive and simultaneous movements as is implied in the above instance.'

A good example of the association of movements is furnished in our acquirement of spoken language, as in committing to memory words, sayings, and passages of books. When a child has perfectly acquired the Lord's Prayer, the chain of association is so firmly knit, that the articulation of the words 'Our Father' is followed almost irresistibly with those next succeeding, and so on to the end. The cohesion in this case is between the vocal movements corresponding to the enunciation of the words. Having gone many times through this one definite succession, the stream of nervous power, in some way that we cannot at present explain, acquires a tendency to fall into this one definite track, and in future to bring on the movements in the exact order that they have so frequently followed.

It is not merely actual movements that can be joined together in this way, but the *ideas* of movement; for a man, meditating in language, and not speaking out his thoughts, can consolidate his trains so as to remember them afterwards.

When we proceed to Sensations and the Ideas, or subsequent traces, of Sensations, and take together with these the variety of our movements with their ideas, we find unlimited scope for the associating principle; and the consequences of its operation spread far and wide in the domains of our happiness, our knowledge, and our active capacity. It is possible here only to present a few illustrative examples.

In the various mechanical acquirements, which include the whole of special handicraft industry and skill, as well as the use of the bodily members in the more general actions of daily life, there may be traced the linkings of actions with actions, or actions with sensations and ideas. The helmsman steering a ship associates in his mind each deviation of the needle from the proper point with the specific muscular exertion to be applied to the wheel to rectify the ship's direction. The workman fabricating in wood, metal, or stone, acquires a firm connection between each aspect of the material and the muscular power to be applied to bring it one step nearer the desired form. The power of copying anything that we see, as in writing, draw-

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ing, molding, etc., when completely mastered, is made up of associations between a visible appearance and the train of movements calculated to reproduce it. After practice, all this is done, as it is called, mechanically, or without those operations of considering, willing, and remembering directions, that are essential to the learner in a new art. The associations that grow up after a certain amount of practice are in this case associations between movements and appearances to the eye, or sensations of sight. In the greater number of crafts, the eye is the guiding sense to the operator, but not in all. Sometimes the effect is vocal, as in performing music, and in making and tuning musical instruments, in speaking, etc. In other arts, the touch is the guiding sense, and in some, as in cookery, the taste and smell direct the operator. Each accomplished workman has in his mind many hundreds, not to say thousands, of couples or aggregates of definite movements with other movements and with sensations, contracted in the course of his apprenticeship to his calling.

Of the circumstances that favor and promote this extensive circle of acquisitions, several may be named as important. In the first place, *a natural activity of temperament*, or an abundant flow of power to the active members, as shown in a great and various mobility of the frame, is a good basis of bodily acquirements. When a force of the system runs feebly towards the muscular framework, being perhaps expended in other ways, as in the thinking powers, more time is requisite to attain difficult mechanical arts. Another important circumstance is *acuteness or delicacy of the sense* involved in the operation. A keen eye, sensitive to minute degrees of effect, is wanted in all the various occupations that turn on visible appearances; a good ear is indispensable to music and the arts of producing sounds, and so on. With a naturally dull sensibility to flavor, no man can easily become a good cook, or a taster of tea or wine. The third consideration is *the natural power of adhesive association* belonging to the individual character. Some minds have originally a more powerful adhesiveness than others, either for things generally, or for special departments. We see this when a number of boys come together at school, and in apprentices learning together. Some are always found taking the start of the rest in rapidity of acquirement; and although the reason may be found in some of the other circumstances now mentioned, yet observation shows that when everything else is allowed for, there remain natural differences in the rapidity with which the adhesive bond is cemented; some acquiring without effort what others take both time and labor to accomplish. The fourth principal circumstance is the *interest* taken in the work, or the degree to which it engages the feelings of the learner. This is a material consideration, accounting for the acquisitions made in matters that we have a strong taste for without our having a pre-eminence in those other points that constitute natural capacity. These four conditions apply more or less to acquisition generally.

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A detailed exemplification of this great principle of our nature might be given through all the departments of the human intellect. The acquirements of speech, as already said, contain a wide range of instances. The adhesion of language is partly in the vocal organs, partly in the ear, and partly in the eye, when we come to written and printed characters. The associations of names with things, with actions (as in obeying direction and command), and with other names (in acquiring foreign languages), are a gradual growth favored by such conditions as the above. The acquirements in Science, Fine Art, and Business, and in everything that constitutes skill or knowledge, proceed upon this plastic property of the mind. It also enlarges the sphere of our pleasures and pains. There are connections established in the mind between our states of feeling and the things that have often accompanied them, so that the accompaniment shall have power to revive the feeling. It is thus that we contract affections, both benevolent and malevolent, towards persons and things, our friends, our home, our country, our property, our pursuits.

This power of stirring up dependent associations to an extent that may be almost called unlimited (though there are limitations), is peculiar to the animal organization. Nothing parallel to it occurs in the mineral or vegetable world. It is a property of mind alone, and has its seat in the nervous tissue. We know that growth or change is requisite to the progress of the adhesion; for it proceeds most rapidly in youth, health, and nutrition, and decays in old age, and during exhaustion and disease. And even to keep our acquisitions from fading away, it is requisite that they should be occasionally revived. A language acquired in early years may be utterly lost by disuse. Sustained practice seems particularly necessary in early education; children's acquisitions are very liable to disintegrate, if not kept up and confirmed by new additions.

Law of Similarity.—This may be expressed as follows: *Present* Actions, Sensations, Thoughts, and Emotions tend to revive their LIKE among *previous* impressions.

If the mind worked only by the principle of contiguity, nothing would ever occur to us except in some connection already formed. But some explanation is necessary as to the precise relationship subsisting between the two distinct forces of mental resuscitation, in order to show at once their distinctness and their connection. When the cohesive link between any two contiguous actions, sensations, or ideas, is confirmed by a new occurrence or repetition, it is obvious that the present impression must revive the sum-total of the past impressions, or reinstate the whole mental condition left on the occasion immediately preceding. Thus, if I am disciplining myself in the act of drawing a round figure with my hand, any present effort must recall the state of the muscular and nervous action, or the precise bent acquired at the end of the previous effort, while that effort had to restore the condition at the end of the one preceding, and so on. But this reinstatement of a former condition by a present act of the same kind is really and

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truly a case of the principle before us, or of like recalling like; and without such recall, the progressive adhesion of contiguous things would be impossible. It would appear, therefore, that similarity is tacitly assumed in the operation of contiguity, and is indispensable to the process by which our acquisitions are gradually built up. Why, then do we set up the associating force of likeness as something independent and distinct? To answer this question, we must advert to the fact, that in those cases where the same impression is deepened by every new repetition, the old and the new are not merely similar, they are *identical*, and the resuscitation takes place without fail, and as a matter of course. But in going deeper into the explanation of the human intellect, we encounter many classes of similars, where there is not absolute identity, but the mixing up of a certain amount of *diversity* with the likeness actually existing. The botanist classing together all the plants of the same order, as, for example, the *Rosaceæ*, has to be struck with the occurrence of certain common characters—viz., the properties that distinguish the order—in the midst of great varieties in all other respects. It is important that he recognize these general marks, whether the plants be trees or shrubs, whether they be poisonous or wholesome, and under many other diversities. It is exceedingly important in science, in the business of life, and even in the creations of fine art, that the mind should take cognizance of likeness surrounded by unlikeness; which is the case that renders it necessary to characterize as distinct the associating force now under discussion. In the case of perfect identity between a present and a past impression, the past is recovered, and fused with the present, instantaneously and surely. So quick and certain is the process, that we lose sight of it altogether; we are scarcely made aware of the existence of an associating link of similarity under such circumstances. But when we pass from complete to incomplete or partial identity, we are more readily led to perceive the existence of this link of attraction between similars, for we find that the restoration sometimes does not take place; cases occur where we fail to be struck with a similitude: the spark of resuscitation does not pass between the new impression and the old dormant one. Then it is that we recognize differences between different minds; one man tracing resemblance and making out identity better than another. Moreover, we can assign reasons connected with the culture of the individual, which partially explain superiority or inferiority in this important faculty; just as we have pointed out the conditions favorable to the rapid growth, of the adhesive bond of proximity. The failure in reinstating an old impression by virtue of a present one like it, is ascribable solely to the want of complete identity. When in some new presentation of an object, the old familiar form is muffled, obscured, distorted, disguised, or in any way altered, it is merely a chance if we recognize it; the amount of likeness still remaining will have a tendency to revive the object, while the points of difference or un-

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likeness will operate against the revival, and tend to restore things of their own kindred. If we hear a musical air that we are accustomed to, the new impression revives the old as a matter of course; but if the air is played with complex harmonies and accompaniments which are strange to us, it is possible that the effect of these additions may be to check our recognition of the melody; the unlike circumstances may repel the reinstatement of the old experience more strongly than the remaining likeness attracts it. If our hold of the essential character of the melody is feeble, and if we are stunned and confounded by the new accompaniments, there is every probability that we shall not be put upon the old mental track made by the same air; in other words, we shall not identify the performance.

A few examples may show the workings of this associating power, and the consequences thence arising. The intellectual operations known under the names Classification, Generalization, Induction, and Deduction, all proceed upon the discovery of likeness among things lying wide asunder in space and time, and very often veiled by diversity. Thus, in order to include in one list all the species of the *rose*, botanists have had to trace the characters of the genus through its various members, wherever they occur, and under the greatest differences in every other respect. It takes a keen identifying faculty—that is, a strong natural tendency for the resurrection of like to meet like—to see the resemblance of some of these species to the rest; and it has happened in many departments of knowledge that a class has remained incomplete for a time, purely from the disguised character of some of the individuals. So in the process termed *induction*, by which a general law is arrived at by comparing instances of it everywhere, there must be an attraction of similars, in order to bring together in the mind the collection of particulars that the induction is based upon. Thus, Newton assembled in his view the various transparent bodies that he had found in the course of his experiments to refract or bend light strongly, his only intellectual instrument for doing so being the bond of likeness operating as a power of recall. Having looked at them in company, he saw that some were remarkable for their weight or specific gravity, and others for containing inflammable ingredients; upon which he raised the general induction, connecting these two properties with high refrangibility. Then, *deductively*, he applied this generalization to the diamond, which refracts light more than any other known substance; and as it is not a heavy material, he extended the other inference to it—namely, that it was made up of some inflammable material, an inference afterwards confirmed by the discovery that it is crystallized carbon. Many of the greatest discoveries in science have turned on the identification of modes of action never before supposed the same, as when Franklin was struck with the resemblance between the atmospheric thunder and lightning and the phenomena of common electricity.

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Assyria.—Sennacherib at the Head of his Army. (Height 88 inches.—British Museum.)

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Another wide field for the operation of the same principle is the region of *illustrative comparisons*, whereby two things widely remote are brought together, in the view either to elucidate one another, or for the sake of ornament and poetic effect. Most men of genius in literature and poetry have contributed original illustrations, similes, metaphors, or comparisons in the course of their compositions. Shakespeare carries the palm in this faculty. The writings of Bacon are remarkably rich in those that serve the purpose of exposition. Science is with him the 'interpretation' of nature: final causes are 'vestal virgins'; they have no fruit: fallacies are 'idols.' Edmund Burke, another master of illustrative comparison, has termed revolutions the 'medicine' of the state, and regular government its 'food.'

An inquiry into the circumstances that render one mind more prolific in new identifications and comparisons than another, apart from difference of original capacity, must refer mainly to the fact that the one has had the greater previous familiarity with the class of things thus brought up by the attraction of similarity. A mathematician is the most likely person to bring up comparisons from mathematics; a botanist is prepared to identify plants; a travelled man provides illustrations from foreign countries; a historian, from history. The sailor is notoriously rich in nautical similes and illustrations. When any one not specially versed in a subject is yet prone to draw upon it profusely in the way of comparison, we must then refer to great natural endowment as the sole explanation. For a full exemplification of both the associating principles and of the complications that they give birth to, see Bain on *The Senses and the Intellect.*

The earliest known attempt to lay down the laws whereby thought succeeds to thought, is in Aristotle's treatise on Memory. He enumerates three different principles of mental resuscitation—viz., Similarity, Contrariety and Co-adjacency. He has been followed by most other philosophers as regards all the three principles. It is now, however, clearly seen and generally admitted, that contrariety is not an independent associating force. When a thing suggests its opposite or contrary, it will be found that the two have been previously together in the mind, and have therefore acquired a mutual hold by contiguity. Such, for example, are black and white, wet and dry, health and sickness, prosperity and adversity, etc. Contraries, in fact, have a natural inseparability; they are of the class of relatives like father and son, which imply each other necessarily, and have no meaning except by mutual reference. It requires no new principle of our constitution to account for suggestion in this particular case. Moreover, when things are strongly contrasted with one another, as high position before a fall, the mind is greatly impressed with the shock of transition, and so retains a lively recollection of the sequence, having by that means a greater tendency to pass from the one to the other. Thus, then, the enu-

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meration of Aristotle is reduced to the two principles that we have now expounded.

Hobbes recognized the principle of contiguity as the foundation of reminiscence; but the Aristotelian philosopher, Vives, who wrote in the 14th c., was the first to specify in minute detail the various circumstances that determine the adhesive bond of recollection. Hume's enumeration is well known to have comprised the three principles of resemblance, contiguity and causation, which he illustrates as follows: 'A picture naturally leads our thoughts to the original, [resemblance]. The mention of one apartment in a building naturally introduces an inquiry or discourse concerning the others, [contiguity]. And if we think of a wound we can scarce forbear reflecting on the pain which follows it, [causation].' Causation, however, is merely a case of contiguity; so also we may say of Order in Place, and Order in Time, which have been given as distinct principles.

An attempt has been made to generalize Similarity into Contiguity, but without success. For a full and critical view of the history of these laws see Sir W. Hamilton's edition of Reid.

ASSOILZIE, v. *ăs-soyl'ē* [OF. *absoïller* or *assoïler*—from L. *ab*, from; *solvo*, I loose]: in *Scots law*, to free one accused from a charge; to find a criminal not guilty; to set at liberty. ASSOILZIEING, imp. *ăs-soyl'ĭng*. ASSOILZIED, pp. *ăs-soyl'ĭd*. ASSOIL, v. *ăs-soyl'*, in *OE.*, to free from guilt; to release; to absolve. ASSOIL'ING, imp. ASSOILED, pp. *ăs-soyld'*. ASSOILMENT, n. *ăs-soyl'mĕnt*, acquittal; release.

ASSONANT, a. *ăs'sō-nănt* [F. *assonant*—from L. *as'-sŏnans* or *assŏnan'tem*, assonant, resounding—from L. *ad*, to; *sonans*, sounding]: resembling in sound. ASSONANCE, n. *ăs'sō-năns* [F.]: resemblance of sounds.

ASSORT, v. *ăs-sŏrt'* [F. *assortir*, to match, to agree—from L. *ad*, *sortiri*, to cast or draw lots—from *sortem*, a lot: It. *sorta*, a sort, a kind]: to arrange or put in lots; to arrange into sorts or classes; to agree or suit. ASSORT'ING, imp. ASSORT'ED, pp.: ADJ. put in lots; arranged. ASSOR'TER, n. one who. ASSORT'MENT, n. the act of separating into lots or arranging into classes; a number of things of the same kind.

ASSOUAN, *ăs-swân'*, or ESSUAN', or ESWAN', ancient Syene: town of Upper Egypt on the bank of the Nile, near the borders of Nubia; 110 m. s. of Thebes; lat. 24° 5' 30" n., long. 32° 54' e. There are few remains of the ancient city. Some granite columns present themselves among the ruins, but do not seem of an early date; and part of a temple stands with a dilapidated portico. Of the town-wall that part to the s. of the old town is still standing; and beyond it is the cemetery of A. where there are numerous tombs, mostly cenotaphs with Arabic inscriptions. In the neighborhood are several granite quarries, some of them remarkable for remains of ancient material cut from the rock, and partially hewn, and for antique inscriptions and tablets, announcing the removal of blocks and the

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reign of the Egyptian monarch by whose order they had been quarried. The environs of A. are sterile and sandy; but the palm thrives, and the dates, which are excellent, form the staple of the trade. Some traffic is carried on in senna, henna, charcoal, wicker-baskets and slaves.

The ancient name Syene is the Coptic word *souan* or *suan*, signifying 'opening;' and the modern one is formed by adding the Arabic *el*, 'the,' softened into *es*, viz., *Es-suan*, 'the opening.' A. and its vicinity are highly interesting to geologists and mineralogists; the kind of granite called syenite receives its name from the town.

ASSUAGE, v. *ăs-swāj'* [OF. *assouager* or *asoager*, to relieve, to assuage—from L. *ad*, to; *suāvis*, sweet]: to soften; to mitigate; to allay; to abate or subside. ASSUAG'ING, imp. ASSUAGED, pp. *ăs-swājd'*. ASSUAGE'MENT, n. mitigation. ASSUA'GER, n. one who. ASSUASIVE, a. *ăs-swā'zĭv*, softening; alleviating; soothing; mitigating.—SYN. of 'assuage': to allay; alleviate; relieve; pacify; mitigate; soothe; calm; tranquillize; appease.

ASSUBJUGATE, v. *ăs-sŭb'joo-gāt* [L. *ad*, and *subjugate*]: in *OE.*, to subjugate; to bring into subjection.

ASSUETUDE, n. *ăs'wĕ-tūd* [L. *assuetūdo*, custom—from *ăd*, *sŭēsco*, I become used]: custom; habit.

ASSUME, v. *ăs-sūm'* [F. *assumer*, to assume—from L. *assūmĕrĕ*, to take to myself—from *ad*, to; *sūmo*, I take; *sumptus*, taken]: to take a person or thing to one's-self; to take upon one's-self; to appropriate; to pretend to possess; to take for granted without proof. ASSUM'ING, imp.: ADJ. haughty; arrogant. ASSUMED, pp. *ăs-sūmd'*. ASSUM'INGLY, ad. *-lĭ*. ASSUM'ER, n. one who. ASSUMPTION, n. *ăs sŭm'shŭn* [OF.—from L. *assumptus*, taken to one's-self]: the act of taking to one's-self; the act of assuming; supposition; the taking up into heaven, applied by Rom. Catholics to the Virgin Mary. ASSUMP'TIVE, a. *-tĭv*, that may be assumed. ASSUMP'TIVELY, ad. *-tĭv-lĭ*. ASSUMPSIT, n. *ăs-sŭmp'sĭt* [L. he has taken to himself]: in *law*, a voluntary promise to perform for, or to pay to, another; an action to recover damages for non-performance of promise.—SYN. of 'assume': to arrogate; usurp; appropriate; affect; pretend; apprehend; imagine; suppose; presume.

ASSUMP'TION: village and river of Lower Canada. About 8 m. below the village, the river flows into the St. Lawrence, or rather into the Ottawa, nearly opposite the lower extremity of the island of Montreal.

ASSUMPTION: city, cap. of Paraguay: see ASUNCION.

ASSUMP'TION OF THE VIRGIN MARY: a festival of the Roman and Greek churches, celebrated Aug. 15. In the 6th c., the idea that the soul and body of the Virgin had been carried up to heaven by Christ and his angels, which had originated in a Gnostic legend of the 3d or 4th c., began to gain credence in the church; and in the East at the beginning of the 7th c. (in the West at the beginning of the 9th c.) the festival of the A. was instituted in commemoration of the event. Until then, from the 4th c.

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the same date had been observed in memory of her death. Liguori, in his *Glories of Mary*, gives a very minute account of the circumstances of her Assumption.

ASSUR'ANCE: see INSURANCE.

ASSURANCE, COMMON: described by Blackstone as the legal evidence of the translation of property, whereby every man's estate is assured to him, and all controversies, doubts, and difficulties are either prevented or removed. For common assurances or *conveyances*, see DEED and CONVEYANCE.

ASSURE, v. *ă-shôr'* [F. *assurer:* OF. *asseurer*, to secure, to prop up—from mid. L. *assĕcūrārĕ*, to give security by a pledge—from L. *ad*, to; *secu'rus*, sure, certain]: to make sure by a token of good faith; to make certain; to give confidence by a promise; to insure, ASSUR'ING, imp. ASSURED', pp. *ă-shôrd':* ADJ. certain; convinced; boldly confident; in *OE.*, affianced. ASSUREDLY, ad. *ă-shô'rĕd-lĭ.* ASSUR'EDNESS, n. the state of being assured. ASSUR'ER, n. ASSURANCE, n. *ă-shô'răns*, a declaration to dispel doubt; the utmost certainty; impudence; conviction; a contract to make good a loss by death or by fire, now restricted to life contingencies. —SYN. of 'assure': to assert; vouch; avouch; declare; aver; protest;—of 'assurance': impudence; boldness; audacity; hardihood; effrontery; shamelessness; confidence; hope; expectation; trust.

ASSURGENT, a. *ăs-sĕr'jĕnt* [L. *assurgen'tem*, rising up —from *ad*, to; *surgo*, I rise]: in *bot.*, rising upwards in a curve.

ASSWAGE, v. *ăs-swāj':* old spelling of ASSUAGE, which see.

AS'SYNT: mountainous, moorish, and very rugged dist. or parish, 25 m. long, 15 broad, in s.w. Sutherlandshire; consisting mostly of a network of rocky heights, interspersed with a multitude (200) of dark, motionless tarns or pools, of various sizes, with some large lochs, the largest Loch Assynt, 6¾ m. long and 1 broad. The district consists of gneiss, Silurian rocks, and primitive limestone. There are a dozen mountains 2,000–3,273 ft. high. Some of the mountains are covered with white bleached stones and protruding rocks like patches of snow. The mountains have frequently the form of artificial pillars and cairns, and are the remains of an enormous denudation of the nearly horizontal strata of the district. Suilven is in form a sugar-loaf, rising 2,399 ft. above the sea, amid a rugged table-land of lower gneiss hills. To Ardvreck Castle, on a promontory on the east side of Loch A., the great Marquis of Montrose was brought prisoner, 1650.

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ASSYRIA, *ăs-sĭr'ĭ-ă:* (called Athura on Persian cuneiform inscriptions, and Assura on the Median): the northernmost of the three great countries that occupied the Mesopotamian plain; bounded on the n. by the Niphates Mountains of Armenia; on the s. by Susiana and Babylonia; on the e. by Media; and on the w., according to some, by the Tigris, but more correctly by the water-shed of the Euphrates, for many Assyrian ruins are found w. of the Tigris. It was thus about 280 m. long from n. to s., and rather more than 150 broad from e. to w. This plain is diversified by mountain-chains on the n. and e., and watered by the Tigris and its affluents, between two of which—the Zab rivers—lay the finest part of the country, called Adiabené. As it was the boundary-land between the Semitic people and Iran, it became the scene of important political events. Its extraordinary fertility enabled it to support a large population. The high degree of prosperity and civilization reached by its inhabitants in very early times is attested not only by ancient writers, but by the extensive ruins of mighty cities, by the canals and contrivances for irrigation, and by the many proofs—furnished by recent excavations—of an acquaintance with the arts and sciences. The ruins of many cities are grouped around Nineveh; while lower down the Tigris exhibits an almost unbroken line of ruins from Tekrit to Bagdad. Under the Mohammedans, this fine country is now almost a desert.

History.—Ancient authorities differ widely from each other respecting the rise and progress, the extent and the duration of the Assyrian empire. Ctesias, a Greek of Cnidus, court-physician to Artaxerxes Mnemon, is quoted by various ancient writers; and his information, though utterly incredible and fabulous, has been followed by most classical historians, and by the whole series of ecclesiastical writers. Many ingenious but futile attempts have been made to reconcile his history with the Scripture narrative. Berosus, a priest of Bel at Babylon, who wrote about B.C. 268, and Herodotus, differ widely from Ctesias, but are confirmed in many important particulars by the Bible, and by the continually increasing evidence derived from cuneiform inscriptions.

In the Bible narrative, we are told that Nineveh was founded by Asshur from Babylon (Gen. x. 11). The latter city therefore must have been the capital of a more ancient empire, as Berosus asserts, and recent discoveries go far to prove, though Greek writers maintain the reverse. The next notice we have of A. does not occur till B.C. 770, when Pul, king of A. invaded Palestine, but was bought off by Menahem, king of Israel. Tiglath-pileser, who succeeded Pul (B.C. 738), conquered Syria, and carried off many of the Jews into captivity. Next Salmanezer (B.C. 731) subdued Israel, which, at the instigation of the Egyptians, had refused to pay tribute. The next is Sennacherib (B.C. 713), who attacked Egypt, and threatened Judah under Hezekiah. He was slain by his two sons, and succeeded by his son Esarhaddon, who was also master of

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Babylon (2 Chron. xxxiii. 11), which, under Nabonassar, had been independent of Nineveh since B.C. 747. Very little credit is to be attached to the expedition of Holofernes recorded in the book of Judith.

After this, the empire appears to have gradually decayed, until at last, in the reign of Sardanapalus II., or Saracus, a league was formed for its destruction between Nabopolassar, governor of Babylon, and Cyaxares, king of Media, which was strengthened by the marriage of Nebuchadnezzar, son of the former, to Nitocris, daughter of the latter. The war and siege are said to have been interrupted by an invasion of the Scythians, which drew off Cyaxares; but at length Nineveh was taken and destroyed about B.C. 606, or, according to Rawlinson, 625. In the time of Darius Hystaspes, A. rebelled without success in conjunction with Media. In the time of Herodotus, the capital had ceased to exist; and when Xenophon passed it, the very name was forgot, though he testifies to the extent of the deserted city, and asserts the height of the ruined walls to be 150 ft. An inconsiderable town seems to have existed on its ruins in the reign of Claudius; and the last notice we have of Nineveh in the classics is in Tacitus.

According to the Greek legends, the Assyrian empire was founded by Ninus. To this monarch and his consort Semiramis are ascribed expeditions on an incredibly magnificent scale against Bactria, Ethiopia, and India. We are told that Semiramis led an army of 3,000,000 infantry, 500,000 cavalry, and 100,000 chariots, and a fleet of 2,000 ships, and was encountered by forces more numerous still, and defeated; that she returned to Nineveh, where she soon afterwards died, and was reckoned among the gods, and was succeeded by her son Ninyas, an effeminate prince. The succeeding part of the history as related by Ctesias is equally false, though that writer managed to make the ancient world give credit to his narrative in preference to that of Herodotus. He gives a list of monarchs from Ninus to Sardanapalus, which is now considered a clumsy forgery. According to him, for thirty generations after Ninyas, the kings led a life of luxury and indolence in their palace; the last of them, Sardanapalus, made a vigorous defense against Arbaces, the rebel governor of Media, but finding it impossible to defend Nineveh, he set fire to his palace, and burnt himself with all his treasures; this event took place 1,306 years after Ninus. Now, the above account represents Nineveh to have perished nearly three centuries before the real date, which was about B.C. 605; also it is utterly incompatible with Scripture. Herodotus assigns to the empire a duration of 520 years, and Berosus of 526. In order to reconcile these conflicting accounts, historians have supposed that Nineveh was twice destroyed, but this supposition is now generally rejected. However, that Nineveh was actually destroyed by fire is proved from the condition of the slabs and statues found in its ruins, which show the action of intense heat.

A. became a Median province B.C. 605, and afterwards in conjunction with Babylonia, formed one of the satra-

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pies of the Persian empire. In B. C. 331 A. at Gaugemela, near Arbela, in A., Alexander defeated Darius Codomannus. In B.C. 312, A. became part of the kingdom of the Seleucidæ, whose cap. was Seleucia, on the Tigris. It was afterwards subject to the Parthian kings, whose cap. was Ctesiphon, and was more than once temporarily in possession of the Romans. When the Persian monarchy of the Sassanides was destroyed by the successors of Mohammed, A. was subject to the caliphs. Their seat was Bagdad from A.D. 762–1258. It has been under the Turks from 1638, at which period it was wrested from the Persians.

Some historical points now to be mentioned have been satisfactorily ascertained from the cuneiform inscriptions. For these we are indebted to Rawlinson's *Herodotus*.

It has not been ascertained when A. first became independent of Babylon (q.v.). The seat of government was first at Asshur (now *Kileh-Shergat*), on the right bank of the Tigris, 60 m. s. of the later capital, Nineveh. At this place have been found the bricks and fragments of vases bearing the names of the earliest known Assyrian kings, for Ninus and Semiramis are to be considered mere inventions of Greek writers. The earliest known king is *Bel-lush*, one of a series of four. These reigns probably occupy from B.C. 1273 to 1200. Of the next series of six, the names of five are recorded on the famous Kileh-Shergat cylinder, the earliest purely historical document as yet discovered in Mesopotamia.

Tiglethi-nin, the last of the Kileh-Shergat series, was succeeded by his son, Asshur-dani-pal, the warlike Sardanapalus I. of the Greeks. He made Calah, the modern *Nimrud*, his capital, 40 m. further n. on the left bank of the Tigris. His annals are very complete. Among other conquests, he mentions that he had taken tribute from Tyre, Sidon, and other Phœnician cities. He was founder of the n.w. palace at Nimrud, which, next to that of Sennacherib at Koyunjik, is the largest and most magnificent of all the Assyrian edifices. The greater portion of the sculptures now in the British Museum are from this building.

Sardanapalus I. was succeeded by his son Shalmanubar, whose deeds are briefly recorded on the black obelisk now in the British Museum, the full account being apparently reserved for the colossal bulls, which seem to have been the usual dedication after a victory. Of his campaigns, the most interesting to us are those in which he defeated Benhadad of Damascus, and Ben-hadad's murderer and successor Hazael. According to his own account, Shalmanubar defeated Hazael, killing 16,000 of his fighting-men, and capturing more than 1,000 chariots (B.C. 884.). The obelisk also records the tribute paid by *Yahua, son of Khumri*, i.e., Jehu, son of Omri, king of Israel. Now Jehu was son of Jehoshaphat, and had done his utmost to extirpate the family of Omri: but probably Jehu, like other usurpers, was anxious to identify himself with the family which he had dispossessed, and of course the Assyrians accepted the title he gave himself,

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Iva-lush, probably the Pul of the Scriptures, is recorded on a pavement-slab from Nimrud to have received tribute from Samaria, Tyre, Damascus, Idumæa, and Palestine, which assertion agrees with the account given (2 Kings, xv.) of the 1,000 talents paid by Menahem. With this king ends the first dynasty, in which we have 18 monarchs from Bel-lush to Iva-lush (B. C. 1273–747).

The later Assyrian empire begins with Tiglath-pileser II. (B.C. 747), and ends with the destruction of Nineveh (B.C. 625). It is plain from Scripture that the empire was in a flourishing condition during the reigns of those kings who came in contact with the Hebrews, and this account exactly accords with the monuments, but contradicts Herodotus. Probably, on the accession of Tiglath-pileser II., Babylon had revolted, and this partial rebellion had reached Herodotus in an exaggerated form. The annals of this prince exist in only a very fragmentary state. The name of his successor, Shalmaneser, has not yet been found on the monuments, The capture of Samaria is usually ascribed to this prince, but his successor, Sargon, expressly asserts that Samaria was taken by himself in his first year. Sargon's palace at *Khorsabad*, near Nineveh, furnished the valuable series of monuments now in the Louvre. Sargon was succeeded by his son, Sennacherib. He fixed the seat of government at Nineveh, and employed the forced labor of 360,000 men to repair the great palace. Later in his reign he built a new and more magnificent edifice, which he decorated with sculptures representing his various exploits. This is the palace excavated by Layard. It contained at least three spacious halls—one of them 150 ft. by 125, and two long galleries, one of 200, the other of 185 ft., besides innumerable chambers. The excavated portion covers above eight acres. The annals of Sennacherib extend only to his eighth year. He relates at length his successful attack upon Babylon, his invasion of Judæa, the submission of Hezekiah, and his deportation of 200,000 Jews. This expedition is not to be confounded with the second invasion, in which he failed ignominiously, and which is not recorded on his monuments. His assassination very shortly after his return from Nineveh, after his second expedition, readily accounts for this silence.

Esarhaddon, his son and successor, held his court sometimes at Nineveh, sometimes at Babylon. Bricks bearing his name have been discovered at *Hillah*, and a tablet at Babylon dated in his reign. This explains how Manasseh was brought to him at Babylon, when he was led captive from Jerusalem (2 Chron. xxxiii.) No record has yet been discovered of this expedition against Palestine. His edifices are not inferior to those of his predecessors. He employed Greek and Phœnician artists, and to them probably are due the beautiful bas-reliefs that adorn the edifices of his erection. The decline of the empire probably commenced with Asshur-bani-pal II. The arts of peace flourished, while the military vigor of the nation declined. The sculptures of this reign are decidedly superior to the earlier in spirit, delicacy, and freedom from conventionality.

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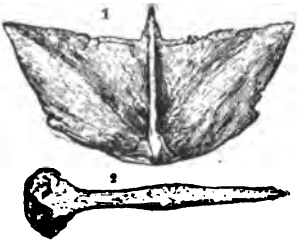
Assyria.—The God Nergal. (British Museum.)



1, Hyoid plate of **Asterolepis**, 1·9th natural size; 2, Internal ridge of hyoid plate, 1·4th natural size.

Sir Francis Drake's **Astrolabe.**—Royal naval collection.

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The slabs show that hunting, not war, was this king's favorite pursuit. He was succeeded by his son, Asshur-emit-ili, the last king of whom any records have yet been discovered. It is uncertain whether Nineveh was destroyed under him or under a successor, the Saracus of Berosus, the effeminate Sardanapalus of the Greeks. The character usually given of this last king, as a debauchee throwing off his indolent habits, and after performing prodigies of valor, perishing by a glorious death, rather than surrender, is derived solely from Ctesias. All we distinctly know is that, finding himself betrayed to the Median king by Nabopolassar, governor of Babylon, he set fire to his palace and perished in the flames.

A singularly important cuneiform discovery was made by Mr. George Smith of the British Museum, the substance of which was made public at a meeting of the Biblical Archæological Soc., 1872, Dec. While engaged on an examination of the collection of Assyrian tablets in the British Museum, Mr. Smith lighted upon a curious series of legends, including a copy of the story of the Flood. On discovering these documents, which were much mutilated, he searched over all the collections of fragments of inscriptions, consisting of several thousands of smaller pieces, and ultimately recovered 80 fragments of these legends. The tablets were originally at least 12 in number, forming one story or set of legends, the account of the Flood being on the 11th tablet. Of the inscription describing the Flood, there are fragments of three copies, containing duplicate texts. These texts belong to the time of Asshur-bani-pal (abt. B.C. 660), and were found in the library of that monarch in the palace at Nineveh. The original text, according to the statements on the tablets, belonged to the city of Erech, and appears to have been either written in or translated into the Semitic Babylonian at a very early period. Mr. Smith is of opinion that its composition cannot be placed later than B.C. 17th c., while it may be much older. The Assyrian story of the Deluge is both like and unlike the Scripture narrative. The Flood is sent as a punishment for sin; the builder of the ark is called Sisit (the *Xisuthrus* of the Græco-Chaldæan Berosus); he gathers into the vessel all his male and female servants, all the sons of the army, and all the beasts of the field; the storm of rain lasts only six days, and yet submerges the whole earth; all life is destroyed; Sisit sends forth a dove which can find no resting-place, and returns; then a swallow, which is also forced to return; then a raven, which does not come back. The ark rests on a mountain, the animals are liberated, an altar is built by the grateful patriarch, and Bel, the Great God, makes a 'covenant' with Sisit. The minuter details of this Assyrian legend diverge greatly from the Hebrew account, and lead to the conclusion that in each we have an independent tradition of some great natural catastrophe in the early ages of human history. Mr. Smith notices that the biblical narrative is the version of an inland people; the name of the ark in Genesis means a chest or box, and not

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a ship; there is no notice of the sea or of launching, no pilots are spoken of, no navigation is mentioned. The inscription, on the other hand, belongs to a maritime people; the ark is called a ship, the ship is launched into the sea, trial is made of it, and it is given in charge to a pilot. This seems to point to the Persian Gulf as the birthplace of the old legend. Mr. Smith returned in 1874 from Chaldæa, and gave an account of his valuable discoveries in a work entitled *Assyrian Discoveries* (1875). Believing that many more legends and histories lay beneath the ruins of the ancient cities of Chaldæa, he was on his way to prosecute his third exploration, when he succumbed to the hardships and privations of the task, and died at Aleppo, 1876, Aug.

Government.—The government was despotic, as suited the character of the people. The empire was a mere congeries of kingdoms bound to the supreme authority only by certain obligations of paying tribute, giving presents, and showing due respect. Each kingdom retained its own rulers, laws, and religion, although we do find some attempts to rule by satraps and collectors of tribute. Tiglath-pileser also boasts, in an inscription, of having punished and crucified the Chaldæans who refused to worship his gods. In consequence of this imperfect organization, the empire was exposed to frequent revolts of the subject nations, when such opportunities offered as a disputed succession, or want of energy in the ruling prince. Then the labor of conquest had to begin anew, and it was sought to diminish the danger of the central power by inflicting severe punishments on the rebels. The history of the Jews has made us familiar with one of these devices—viz., the wholesale deportation of the inhabitants of the offending district. It may be readily believed that such an empire, though imposing from the magnificence and wealth of the capital, yet, from the impoverishment and weakness of the subject states, was continually liable to fall to pieces, and was ill-fitted to resist an attack from without. That A. did actually last for five centuries, was owing to its long succession of warlike princes, and to the energy of the population.

Religion.—The religion of the Assyrians was nearly identical with that of the Babylonians. It was a gross polytheism, their gods being thousands in number, and each village having its own particular deity. From thousands of theological tablets now in the British Museum, it is known that each divinity had many names, and some of them as many as fifty titles besides. Again, many deities prominent in the Babylonian pantheon are either unknown or subordinate in the Assyrian. Besides, the same gods did not remain equally popular throughout. The supreme god was Asshur, probably the deified patriarch. His worship was confined to Assyria. He is generally associated in the inscriptions with *Nin* and *Nergal* (2 Kings, xvii. 30), who are represented by the man-bull and the man-lion. The winged globe, so often seen in the sculptures, from which a figure with a horned

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helmet shoots his arrows, is supposed to be the emblem of Asshur. Next in rank is the governing triad, answering to the Pluto, Jupiter, and Neptune of the classical mythology; the next group corresponds to Æther, the sun and the moon; then five inferior deities, representing the five planets. Each god is associated with a goddess. Mylitta, or Beltis, is the 'queen.' The male and female powers of the sun are represented in the Scripture phrase, 'Adrammelech, and Anamelech, gods of Sepharvaim'—that is, of Sippara, a town a few miles above Babylon. *Bel-merodach* was originally an inferior deity, son of Héa, the fish-god; but under the later Babylonians, we find him monopolizing the greater part of the homage which used previously to be divided among several. Nisroch (2 Kings, xix., 37) has not been yet ascertained. Nebo (Isaiah, xlvi.) is one of the five planetary gods, and corresponds to Mercury. The systems of notation, divisions of time, the planets and stars, animals and metals, divination and astrology, were all more or less closely connected with theology.

Ethnology.—The Assyrians have been assigned by some ethnologists to the Aryan race, but it is now generally acknowledged that they were a branch of the Semitic family of nations, and therefore were members of the same grand division of the human race as the Syrians, the Phœnicians with their colonies, the Jews, and the modern Arabians. In B.C. 20th c., Semitism, as a distinct ethnic element, appears to have first developed itself. The original races variously called Scythic, Turanian, or Tatar, appear to have once been spread over the whole space from the Caucasus to the Indian Ocean, and from the Mediterranean to the mouths of the Ganges. Their type of language has continued to our time to exist in four-fifths of Asia, and in some of the remoter corners of Europe, as among the Finns, Lapps, Turks, and Hungarians. In Mesopotamia, and in the valley of the Nile, where natural advantages induced men early to form settled communities, the rude and inartificial type of language was developed into Hamitism, and afterwards still further improved into Semitism. Then seems to have commenced a series of migrations. Asshur went forth probably at this time from Babylon to A., Abraham and his followers to Palestine, the Joktanian Arabs to Arabia. From these seats, Semitism was afterwards carried to Cyprus, to the S. seaboard countries of Asia Minor, to Carthage, Sicily, Spain, and Western Africa.

The traditions of A. indicate a very early connection between Ethiopia, Arabia, and the cities on the Euphrates. Mesopotamia undoubtedly contained a large proportion of Arabians, and this accounts for the fact that Herodotus styles Sennacherib king of the Arabians and Assyrians. The Chaldæans, colonies of whom were planted in Armenia by the Assyrian kings, are supposed by some to have been a foreign tribe, which had immigrated from the N., and become a priestly caste. But the *Akkad* race, of which the Chaldæan is a tribe, is with more probability thought

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to have inhabited Babylonia from the remotest times, and by it the earliest civilization in Mesopotamia was originated. Probably the art of picture-writing was possessed by the Hamitic tribes who lived in the valley of the Nile, and passed eastward to the Euphrates. The *Akkad* language appears to have been formed before Semitism attained its peculiar development and organization. Long after Semitism had become predominant in Mesopotamia, the *Akkad* or Chaldæan alphabet continued to be the scientific language in which all the tablets relating to mythology, astronomy, or science, as well as most historical and official records, were written. This alphabet was adopted with certain modifications by the Semitic tribes, which became predominant in Assyria. The cuneiform characters were elaborated from the forms of natural objects, and gradually became phonetic from being symbolic, and for convenience of engraving, assumed the form of arrowheads instead of the rounded and flowing forms which are introduced by the use of plastic materials. After the Aryan race had spread more extensively in Western Asia, the Persian monarchs, when they wished to make any communication to their subjects generally intelligible, found it necessary to publish it in three languages belonging to the principal divisions of human speech; hence the trilingual inscriptions of Behistun, etc., which consist of an Indo-European, a Tatar, and a Semitic column. It is still necessary in many places to employ three tongues, representatives of the three families, Persian, Turkish, and Arabic.—See Lenormant, *La Langue Primitive de la Chaldée.*

Antiquities, Civilization, etc.—The excavations carried on by M. Botta, French consul at Mosul, and by Layard near Mosul, Khorsabad, and Koyunjik, have laid open palaces

Lion-hunt.
(From the Northwest Palace at Nimrud.)

and buildings full of sculptures, all covered with inscriptions, in deciphering which considerable progress has been made, and more may be expected. Among the most remarkable monuments now in the British Museum are two winged, human-headed lions, 12 ft. high, and 12 ft. in length; winged human-headed bulls of similar dimensions with the lions; winged sphinxes; and the famous obelisk

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of black marble, sculptured on the four sides. On this last are represented a victory, a prisoner prostrate at the feet of the king, and foreign people offering tribute, and leading such animals as the Bactrian camel, elephant, lion, and rhinoceros—animals found only in lands far e. of the Tigris. The bas-reliefs are very numerous, exhibiting especially war and hunting. The march, the onset, the pursuit, the siege, the passage of rivers, the submission and treatment of captives, secretaries noting the number of heads taken in battle, and the amount of spoil; the chase of the lion, of the antelope, of the wild ass, and other animals—such are the favorite subjects of the Assyrian sculptor. Nor are they treated in the conventional style of Egypt, but in a manner which, for grace, spirit, correctness, and delicacy of execution, excels everything else known in Asiatic art. The artists follow some modes of representation different from the modern; for instance, a bull has five legs given him, in order that from all points of view he may be seen with four; a ladder stands edgeways against a wall, to show it is not a pole. A truthful impression is always aimed at. The labor bestowed on the careful finish of a priest's dress, and in the tasteful decoration of an article of furniture, proves them to be the work of an ingenious and painstaking people. From the bas-reliefs we gain little information respecting the private life of the Assyrians. There are a few which represent the foddering of cattle, women riding on mules, etc.

It is natural to suppose that Nineveh—a wealthy and luxurious city—imported many of the products of other countries, yet the manufactured goods would mainly be of home production. The jars, bronzes, glass bottles, carved ornaments in ivory and mother-of-pearl, engraved gems, bells, earrings, arms, utensils, are of excellent workmanship. The ornaments especially are in good taste, and evince no inconsiderable skill in the working of metals. Transparent glass was not unknown, nor the use of the lens as a magnifying agent. The Assyrians knew the principle of the arch, the use of the lever and roller, and the construction of aqueducts and drains. In the arts of peace, they appear to have been not inferior to any ancient nation; while their conquests, and the long duration of their empire, suffice to prove their capacity for war.—See Rawlinson's *Five Great Monarchies of the Ancient World, Chaldæa, Assyria, Babylonia, Media, and Persia;* George Smith's *Assyrian Discoveries* (1875), his *Assyria* (S.P.C.K.), and his *Babylonia* (new ed. by Sayce); and the article *Babylonia*, in the *Ency. Brit.*, 9th ed.

ASSYRIAN, a. *ă-sĭr'ĭ-ăn:* of or pertaining to Assyria: N. an inhabitant of. ASSYRIOL'OGIST, n. *-ŏl'o-jĭst*, one who makes the antiquities and history of Assyria his special study.

ASTACOLITE, n. *ăs-tăk'ō-līt* [Gr. *astăkos*, the crayfish or lobster; *lithos*, a stone]: a term applied to the fossil remains of crustaceans, like the crayfish or lobster.

AS'TACUS: see CRAYFISH: LOBSTERS.

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ASTARTE, *ăs-tär'tē* (*Ashtaroth* in the Old Test.): chief female deity of the Phœnicians, Carthaginians, and Syrians (Syria Dea), worshipped also by the Jews in times when idolatry prevailed. A. was the original from which the Greeks borrowed their Aphrodite (q.v.). As Baal was god of the sun, A. was goddess of the moon. Her chief temples were in Tyre and Sidon. According to ancient accounts, her worship was of a licentious character. The oldest known image of her—that in Paphos—represented her simply under the form of a white conical stone. In Canaan and Phœnicia she was subsequently typified under the form of a cow, or sometimes she had only a cow's or bull's head; still later, her emblem became a star; and finally, she was conceived of as the 'queen of heaven,' sitting on a lion, her head surrounded with rays, and in the one hand a thunderbolt, in the other a sceptre.

ASTAR'TE: genus of Mollusca, with bivalve shells; type of a family *Astartidæ*, very closely allied to the *Veneridæ* or Venus family. It is interesting chiefly with reference to geologic changes and the history of life and organization, because only a few species are now known to exist, and these limited to the North Atlantic and Arctic oceans; whereas the fossil species are extremely numerous, commencing with the *lias* period, and distributed over the whole world. The Astartidæ may be regarded as having given place to the Veneridæ, which commenced with the oolitic period, and are among the most abundant bivalve mollusca of the present time.

ASTATIC, a. *ăs-tăt'ĭk* [Gr. *a*, without; *statos*, that stands or remains]: being without polarity, as a magnetic needle; not being under the influence of a directive agent.

A-STAY': the position of an anchor when, during heaving, the cable forms an angle with the surface of the water in line with the stays of the ship.

ASTEISM, n. *ăs'tē-ĭzm* [Gr. *asteismos*—from *asteios*, urbane; *astu*, a city]: in *rhet.*, refinement of speech; urbanity of manners.

ASTELMA, n. *as-tĕl'ma* [Gr. *a*, without; *stelma*, a girdle]: genus of plants belonging to the order *Asteraceæ*. The species are beautiful Cape shrubs with 'everlasting' flowers.

ASTER, n. *ăs'tĕr* [Gr. *astēr*, a star]: genus of plants of the nat. ord. *Compositæ*, which Lindley has therefore chosen to call *Asteraceæ*. The flowers have a star-like arrangement. The ray and the disk are of different colors. The genus contains a great number of species, both herbaceous and shrubby, which have been arranged into six or seven groups, regarded by many as distinct genera. Only one species, *A. Tripolium* or *Tripolium vulgare*, the Sea Starwort, is a native of Britain. It is common in salt marshes. A number of perennial species are in cultivation as garden-flowers, of which the New-England A. (*A. Novæ Angliæ*) and the Michaelmas Daisy (*A. Tradescanti*), both

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natives of N. America, are perhaps the most common, and, with some of the other species, are prized as among the comparatively few flowers to be seen at that dull season when autumn is giving place to winter. But the best known and most valued of all the asters is the China A. (*A. sinensis*), a summer annual, of which many varieties are in cultivation, and new ones are continually introduced. It was brought from China in the earlier part of the 18th c. The varieties exhibit great diversities of form and color. The plant delights in a rich free soil. In the n. parts of the United States, the seed is usually sown in April in a hot-bed, or in pots under a frame, and the young asters are planted out in the open air in May. They flower from July to the end of autumn.—*A. argophyllus*, or *Haxtonia argophylla*, is a shrub, native of Van Diemen's Land, smelling strongly of musk. There are no less than 50 species of wild A. in e. and central United States, giving great beauty to our autumn foregrounds.

ASTERABAD': see ASTRABAD.

ASTERACANTHUS, n. *ăs'tĕr-ă-kăn'thŭs* [Gr. *aster*, a star; *akantha*, a thorn or spine]: a genus of fossil fin-spines of fishes, often of large size, having their surfaces richly ornamented with star-like tubercles.

ASTERIA, n. *ăs-tē'rĭ-ă*, or ASTERITE, n. *ăs'tĕr-īt* [Gr. *aster*, a star]: a variety of corundum or star sapphire, which, when cut in a certan way, shows a bright opalescent star of six rays. ASTERIATED, a. *ăs-tē'rĭ ā'tĕd*, radiated; star like.

ASTE'RIAS and ASTERI'ADÆ: see STARFISH.

ASTERISK, n. *ăs'tĕr-ĭsk* [Gr. *asteris'kos*, a little star—from *aster*, a star]: a sign or symbol (*), used in writing and printing, either as a reference to a note at the bottom or on the margin of the page. The obelisk (q.v.), or dagger (†), and many other marks, are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, etc. The A. and other similar signs may have any arbitrary meaning assigned to them at the will of the writer, an explanation being previously given of what the signification is to be. Omission of words may be marked with two or more stars. The Greek grammarians, or critics, used the A. to mark a passage that had been unjustly suspected, but was to be held as genuine, or a passage in any way remarkable; the obelisk marked an interpolated or an objectionable word or passage.

ASTERN, ad. *ă-stĕrn'* [AS. *a*, on or at, and *stern*, behind]: at the stern; in or at the hinder part of a ship; behind. To GO ASTERN, to move backwards as a vessel, as from the action of currents or the wind. To BACK ASTERN, to move backwards.

ASTEROID, n. *ăs'tĕr-oyd* [Gr. *aster*, a star; *oidos*, likeness]: one of the minor planets. See PLANETOIDS. ASTEROI'DAL, a. pertaining to the small planets. ASTERISM, n. *ăs'tĕr-ĭsm*, a cluster of stars: a constellation.

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ASTEROIDEA, n. plu. *ăs'tĕr-oy'dē-ă* [Gr. *aster*, a star; *eidos*, resemblance]: the order of animals of which the common five rayed star-fish is taken as the type; an order of *Echinoderms* having one opening to the alimentary canal, and a rayed or star-like structure. **As'teroid**, n. *-oyd*, one of the asteroidea: **Adj.** of or pertaining to; rayed; star-like.

ASTEROLEPIS, n. *ăs'tĕr-ō-lĕ'pĭs* or *-ŏl'-* [Gr. *aster*, a star; *lepis*, a scale]: a gigantic ganoid fossil fish of the old red sandstone.

ASTEROPHYLLITES, n. plu. *ăs'tĕr-ō-fĭl'īts* [Gr. *aster*, a star; *phullon*, a leaf]: genus of fossil plants abundant in the coal-measures, and called sometimes Star-leaf, from their star-like whorls of linear leaves. Their affinity is not yet positively decided, but they are usually considered the branches of the *Calamites* or *Calamodendron*.

ASTHENIC, a. *ăs-thĕn'ĭk* [Gr. *a*, without; *sthenos*, strength]: weak; debilitated. **Asthenia**, n. *ăs-the-nī'ă*, in *med.*, want or loss of strength; debility. **As'thenol'ogy**, n. *-ŏl'ŏ-jĭ* [Gr. *logos*. discourse]: a discourse on diseases connected with debility.

ASTHMA, n. *ăst'mă* [Gr. *asthma*—from *ăō*, I blow, I breathe]: a disease of the organs of breathing attended with cough and difficulty of breathing. **Asthmatic**, a. *ăst-măt'ĭk*, or **Asthmat'ical**, a. *-ĭ-kăl*, troubled with difficulty of breathing.

A. is characterized by the breathing, previously natural, becoming difficult, accompanied by wheezing and a distressing sense of tightness in the chest. A. generally appears at first after some inflammatory affection of the respiratory mucous membrane, and more especially in those who have led dissipated lives. In others, it is clearly hereditary, and frequently affects several members of the same family. A. may be habitual, or may occur in spasms, generally preceded by some premonitory symptoms, as in some by great drowsiness; in others, by extreme wakefulness and unusual mental activity and buoyancy of spirits; and a physician reports one case in which an attack of ophthalmia occurred.

The spasms may occur at any hour; but in nineteen out of twenty cases they waken the patient from sleep between three and four in the morning. The horizontal position facilitating the flow of blood to the right side of the heart, and therefore to the lungs, the disadvantage at which the muscles of respiration are placed, and the greater readiness with which sources of irritation act during sleep, explain this fact.

Persons subject to A. scarcely dare fall asleep after any imprudence in diet; if they continue awake till their supper is fairly digested, and the stomach empty, they may go to sleep fearlessly, and have a good night's rest. The asthmatic paroxysm is thus described by Dr. Hyde Salter, a late authority in England on this common but terrible disease: 'The patient goes to bed and sleeps two or three

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hours, becomes distressed in his breathing, and begins to wheeze, so as to awaken those in adjoining rooms. He awakes, changes his position, falls asleep again and again, and the miserable fight between A. and sleep may go on, till the increased suffering does not allow the patient longer to forget himself for a moment; he becomes wide awake, sits up in bed, throws himself forward, plants his elbows on his knees, and with fixed head and elevated shoulders, labors for breath like a dying man.'

If the spasm is protracted, the oxygenation of his blood is imperfectly performed, owing to the scanty supply of air, and his extremities get cold and blue, but at the same time the violent muscular efforts at respiration cover him with sweat. The pulse is always small. The muscles of the back and neck attached to the ribs act as extraordinary muscles of respiration. The chest enlarges during the paroxysm, but in it there is almost perfect stagnation of air. The respiratory tubes affected are very small, and the parts at which they are so constricted are constantly shifting.

The remedies commended for A. are numerous, but not to be depended on. They consist in paying attention to the digestive system, and in anti-spasmodics, taken either internally or by inhalation.

ASTI, *ăs'tē* (*Asta Pompeia*): city of Piedmont, govt. of Alessandria, on the left bank of the Tanaro, on the railway from Turin to Genoa, 26½ m. e.s.e. of Turin. It is a large town, with walls considerably dilapidated, and the streets generally very narrow and irregular. It is the seat of a bishop, and has a court of justice and a royal college. There is carried on a considerable trade in silk and woolen fabrics, leather, and hats, as well as in wines and agricultural produce. A. is a town of high antiquity, having been famous for its pottery before its capture by the Gauls, B.C. 400. On the occcasion of its being again taken and destroyed in an irruption of the Gauls, it was rebuilt by Pompey, and received the name of Asta Pompeia. In the middle ages, A. was one of the most powerful republics of Upper Italy. It was captured and burnt by the emperor Frederick I., 1155; and after a series of vicissitudes, it came into the possession of the Visconti of Naples, by whom it was ceded to the French, in whose hands it remained till the middle of the 16th c., when it came into the possession of the Dukes of Savoy, as it still remains. Alfieri was born here, 1749. Pop. (1893) 31,033.

The district of Asti, one of the six subdivisions of the govt. of Alessandria, is bounded on the w. and n. by the province of Turin, s. by Alba, s.e. by Alessandria Proper and n.e. by the province of Casale. The surface is hilly and picturesque. The soil rests upon limestone abounding in fossils, and is fertile, producing corn, fruit, and wine. It is celebrated for a fine white wine resembling champagne, called *vino d'Asti*. Silk is one of its most important products.

ASTIGMATISM, n. *ă-stĭg'ma-tĭzm* [Gr. *a*, without;

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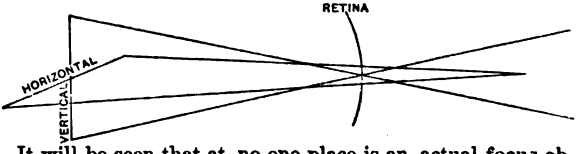
stigmatizō, to prick, to puncture]: condition of the eye in which parallel rays of light are not brought to a focus by the media. It is a frequent cause of defective eyesight. A. in the vast majority of cases is due to irregularity in the curvature of the cornea; though it may arise from imperfections in the lens, irregular contraction of the ciliary muscle, or possibly defect in the retina. In the normal eye, parallel rays are brought to a focus accurately on the retina. In the myopic and hypermetropic eyes, rays are brought to a focus, though not on the retina; but in the astigmatic eye, rays of light never come to a focus either on the retina or elsewhere. According to the laws of refraction, the smaller the curve of the refracting body the shorter the course of the traversing ray. If, therefore, in one meridian of the cornea, the curvature is smaller than that at right angles to it, it is evident that rays of light traversing the smaller curve will be brought to a focus sooner than the rays traversing the greater curve. Suppose a case in which the vertical meridian brings rays accurately to a focus on the retina, but in which rays passing through the horizontal meridian are brought to a focus behind the retina, as shown in the accompanying diagram (in which Vertical denotes rays striking the cornea from a meridian standing as it were upright before the eye, while Horizontal denotes rays striking the cornea from a meridian extending from side to side before it.



It will be seen that at no one place is an actual focus obtained, both of the rays from the horizontal meridian and of the rays from the vertical meridian—that when the latter are focused on the retina, the former have not yet reached a point; and on the other hand, when the former rays have reached a focus the latter rays are far divergent, having come to a point and crossed at the retina. This condition may exist in various forms: (*a*) simple hypermetropic A., in which the rays in one diameter fall on the retina, but rays at right angles fall behind: (*b*) simple myopic A., the exact reverse of the preceding, rays in one diameter being focused on the retina and the rays at right angles being brought to a focus in front of the retina: (*c*) compound hypermetropic A., in which all rays fall behind the retina, but some further back than others: (*d*) compound myopic A., in which all rays fall in front of the retina, but some further in front than those at right angles to them: (*e*) mixed A., a form in which rays in one meridian fall behind the retina, and in the meridian at right angles the rays are focused in front of the retina, a combination of hypermetropia and myopia in the same eye. The effect of A. is to blur outlines of objects, rendering them much less distinct and clear cut. A. is also a frequent source of headache, and of many of the nervous phenomena of civilized life. Many sufferers have been permanently relieved of their headaches by the accurate

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fitting of a pair of glasses which corrected their astigmatism. —A. is corrected by means of cylindrical glasses, either alone or in combination with spherical lenses which unequally refract light, bringing parallel rays to different foci to suit each case. —For fuller information, see Noyes, *Diseases of the Eye;* Soelberg Wells, *On Diseases of the Eye;* Fox and Gould, *Diseases of the Eye;* Brudenel Carter *On the Eye.*

ASTIR, ad. *ă-stĕr'* [AS. *a*, on, and *stir*]: on the move; active.

ASTOMATOUS, a. *ă-stŏm'ă-tŭs* [Gr. *a*, without; *stom'-ata*, mouths]: mouthless; without a true mouth or aperture; also spelt ASTOMOUS, *ăs'tō-mŭs.*

AS'TON, LUISE: b. abt. 1820, near Halberstadt, Prussia: German authoress of some note, but known principally for her zeal for the 'rights of women,' accompanied with eccentricities of conduct which brought her into collision with the police. During the Slesvig-Holstein war, however, she showed heroism and self-sacrificing devotion as a hospital nurse. She has written various books, of no great note.

ASTONE, v. *ăs-tōn'*, or ASTONY, v. *ăs-tōn'ĭ* [see ASTONISH]: in *OE.*, to confound with fear and amazement; to terrify; to astonish. ASTONIED, pp. *ăs-tōn'ĭd*, for *astonished*, a word occasionally occurring in Scripture.

ASTONISH, v. *ăs-tŏn'ĭsh* [OF. *estonner*, to amaze—from L. *attonārĕ*, to thunder at, to stress—from L. *ad*, to; *tono*, I thunder: AS. *a*, intensive, *stunian*, to make stupid with noise]: to strike dumb as with fear or wonder; to fill with sudden fear and wonder; to amaze; to confound with surprise. ASTON'ISHING, imp. ASTON'ISHED, pp. *-ĭsht.* ASTON'ISHINGLY, ad. *-lĭ.* ASTON'ISHMENT, n. confusion of mind from fear or wonder; amazement; the cause of amazement. —SYN. of 'astonish': to surprise; amaze; astound; overwhelm.

ASTOR, *ăs'tor*, JOHN JACOB: 1763–1848; b. in a village near Heidelberg, Germany. After spending some years in London, he came to America, 1783, and soon invested his small capital in furs. By economy and industry, he so increased his means that after six years he had acquired $200,000. He became the founder of the American Fur Company, and although the increasing influence of the English Fur Companies in N. America was unfavorable to his plans, he ventured to fit out two expeditions to the Oregon territory—one by land, and one by sea—the purpose of which was to open a regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria (q.v.) was established; but the war of 1812 stopped its prosperity for a time. From this period A.'s commercial connections extended over the world, and his ships were found in every sea. At his death he left property amounting to $30,000,000. He left a legacy of $400,000 for the establishment of a public library in New York. See ASTOR LIBRARY. (See Washington Irving's *Astoria.*)—His wealth was mainly inherited

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by his son, WILLIAM B., who continued to augment it till his death in 1875, when he is said to have left more than $50,000,000. He added $450,000 to his father's bequest for a public library. He was known as the 'landlord of New York' from the extent of his property in that city.

ASTOR, WILLIAM WALDORF: great grandson of John Jacob A. the elder, and son of John Jacob A. 2d: b. New York, 1848, Mar. 31. He was educated by private tutors in the United States and Europe; graduated at the law school of Columbia College 1875; was elected a member of the state assembly 1877 as a republican, and the state senate 1879, serving on the committees on militia, cities, judiciary, commerce and navigation, and public expenditures; was defeated for member of congress 1880; was appointed U. S. minister to Italy, succeeding the late George P. Marsh, 1882; and held the office till 1885. He practiced his profession but a short time, and excepting his public duties has applied himself to the care of the vast landed estate of his family. In his leisure he has published two Italian romances, *Valentino* (New York, 1886), and *Sforza: a Story of Milan* (1889). By the death of his father 1890, Feb. 22, he became the head of his family and inherited one of the vastest estates of modern times.

ASTORGA, *ăs-tor'gâ*, EMANUELE D': b. 1680, in Sicily: musician. His father, a baron of Sicily, in the contest respecting the annexation of the island to Spain, was delivered to the enemy by his own mercenary soldiers, and was put to death 1701. Through the interest of the Spanish Princess Ursini, A. was educated in a monastery at Astorga in Leon. Here he made great progress in music, and afterward was at the court of the Duke of Parma, and of the Emperor Leopold. His best work is the *Stabat Mater*, a masterly composition, of which the original score is preserved in Oxford.

ASTORIA, *ăs-tō'ri-a:* city, cap. of Clatsop co., Or.; at the junction of the Young's and the Columbia rivers, near the mouth of the Columbia; 98 m. n.w. of Portland, 555 m. n. of San Francisco. It was founded by John Jacob Astor, 1811, as a fur-trading station (see Washington Irving's *Astoria*). It has a harbor affording unlimited anchorage; defended by Fort Stevens on the s. side of the entrance to the Columbia, 6 m. below the city, and by Fort Canby on the n. side, 12 m. below; and undergoing improvement by the federal govt. on an appropriation of $1,300,000. The business portion is built entirely on piles over tide-water, on the s. bank of the river, here 4 m. wide, and the residence streets rise in parallel terraces on the face of a lofty hill. The city is a port of entry, and has more than 3 m. of excellent wharfage front. Water is brought 11 m. to a reservoir holding 3,000,000 gallons, giving a pressure of 240 ft. at tide-water; the water-works system cost $100,000. The city has electric light (cost $75,000) and gas plants. It contains public high and graded schools, 6 church edifices (Bapt., Congl., Meth. Episc., Presb., Prot. Episc.,

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and Rom. Cath.), Odd Fellows' temple, Rom. Cath. hospital, 1 national bank (cap. $50,000), 1 private bank, and 2 daily and 4 weekly newspapers. Salmon fishing and canning are principal industries: there are about 40 canneries in the city and suburbs; average value of the season's salmon catch, $2,500,000. Lumbering also is an important industry, about 400,000 ft. per day of logs being 'driven.' The city ships largely to San Francisco and Liverpool. Pop. (1890) 6,184; fishing season 10,000.

ASTOR LIBRARY: a chartered institution, given to the city of New York by the will of John Jacob Astor, who died, 1848, leaving a legacy of $400,000 for the purpose. From this amount the original building of the library in Lafayette Place was erected, and opened to the public, 1854, Jan. 1. Two years later, William B. Astor, eldest son of the former, gave land adjoining, on which was erected a second building, of the same dimensions as the first, and to these two has since been added a third similar structure. The entire edifice is connected, and forms a frontage of about 200 ft., with a depth of 105 ft. and a height of 70 ft. William B. Astor added to the original bequest about $250,000 during his life, and, by a codicil to his will, $200,000 additional. His son, John Jacob A. 2d (1822, June 10—1890, Feb. 22), bequeathed the trustees $400,000, directing that the net income should be expended from time to time in the purchase of books to be added to the library and for no other purpose; and a further sum of $50,000 as a permanent fund whose income should be used only for paying the trustees the sum of $10 each for attending each regular meeting of the corporation. These bequests brought the entire donations of the Astor family to the library in land, books, and money to nearly $1,500,000. The first board of trustees comprised Washington Irving, William B. Astor, D. Lord, Dr. J. G. King, Dr. J. G. Cogswell, Fitz Greene Halleck, Samuel B. Ruggles, S. Ward, Charles Astor Bristed, and the mayor of New York, *ex officio*. Dr. Cogswell collected all the books for the original building—known as the South Library—and made the entire catalogue. He held the office of supt. till 1861, when Frederick Schraeder succeeded him. Dr. E. R. Straznicky was supt. 1871–73, James Carson Brevoort 1873–75, and Robbins Little has held the office since 1878. The A. L. is a public library of reference, no books being permitted to be removed from the premises. Any person over 14 years of age is entitled to the privilege of consulting the various works of a general character. For special books, unique productions, rare Americana, and the rich collection of publications that cannot now be duplicated in Europe or America, special permission must be obtained. The library is closed on Sundays, public holidays, and during the month of Aug. for cleaning. In 1894 it had 260,611 vols., and an income from productive funds of $47,054. In 1895 the A. L. was consolidated with the Lenox Library and the Tilden Trust.

ASTOUND, v. *ăs tound'* [see ASTONISH]: to strike dumb with amazement. ASTOUND'ING, imp. ASTOUND'ED, pp.

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ASTRABAD, *ăs'tra-băd':* town in the n. of Persia, cap. of the province of A.; at the foot of the n. slope of the Elbruz Mts., on a small river which runs into A. Bay, at the s.e. extremity of the Caspian. It is 20 m. from the Caspian Sea; lat. 36° 50′ n., long. 54° 31′ e. It was long the residence of the Kajar princes from whom the present shah of Persia is descended; but on account of its situation in a remote corner of the kingdom, it was not made the metropolis, and it has sunk in importance. It is still inclosed by a dry ditch and mud-wall, 3 m. in circumference, but its great towers have disappeared. Trade has increased since the establishment of a Russian consulate. The causeway constructed by Shah Abbas is kept in good repair, and connects A. with Khorassan, Afghanistan, etc. The town is very unhealthful during the summer rains. Pop. 6,000–8,000.

ASTRADDLE, ad. *ă-străd'dl* [AS. *a*, on, and *straddle*]: with the legs on opposite sides of a thing.

ASTRÆA, n. *ăs-trē'a* [Gr. *aster*, a star]: the goddess of justice; one of the minor planets. ASTRÆIDÆ, n. plu. *ăs-trē'i-dē*, the family of star-corals, so called from the great development of their radiating septa. ASTRÆ'AN, a. pertaining to Astræa; favored by her presence.

ASTRÆA, *ăs-trē'a:* daughter of Zeus and Themis, or of Astræus and Aurora, was the goddess of justice, the last of all the goddesses who left the earth when the golden age had passed away and men began to forge weapons and perpetrate acts of violence. She took her place in heaven as the constellation Virgo in the zodiac.—Greek art usually represented her with a pair of balances in her hand, and a crown of stars on her head.—A. is also the name of one of the Planetoids (q.v.).

ASTRÆ'A, ASTRÆIDÆ: see CORAL: MADREPORE.

ASTRAGAL, n. *ăs'trä-găl* [L. *astrăg'ălus;* Gr. *astragalos*, the upper joint of the neck, the ankle-joint]: a small circular or semicircular bead; the ring-like molding round the top and bottom of the column of a pillar; the beaded zinc bars used by zinc-workers in making diamond and ornamental window-frames. ASTRAGALUS, n. *ăs-trăg'ä-lŭs*, in *anat*, a bone of the foot, which, by a convex upper surface and smooth sides, forms, with the leg-bones, the hinge of the ankle-joint. Its lower surface is concave, and rests on the *os calcis*, or heel-bone, to which it is attached by a strong ligament. In front, it has a round head, which rests in the concavity of the scaphoid, another bone of the tarsus, and upon an elastic ligament, its pressure upon which gives in a great measure the necessary elasticity to the foot: it is at this joint that inversion and eversion of the foot take place. It is evident that the A. is a bone of great importance to the member, as it supports the weight of the body in standing, and enters into most of the movements of the foot. It is occasionally displaced, usually in front of the outer ankle.

ASTRAGAL'EÆ: see ASTRAGALUS.

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ASTRAGALOMANCY, *ăs-trăg'a-lo-măn'sĭ* [Gr. *astragalos*, dice; *manteia*, divination]: pretended divination performed by throwing down small dice with marks corresponding to letters of the alphabet, and observing what words they formed. It was practiced in the temple of Hercules in Achaia.

ASTRAGALUS, *ăs-trăg'ă-lŭs:* genus of plants of the nat. ord. *Leguminosæ*, sub-order *Papilionaceæ*. The pod is

Astragalus Boëticus.

more or less perfectly 2-celled. The leaves are pinnate, with a terminal leaflet. The species are numerous, shrubby, and often spiny, or unarmed and herbaceous. A number of the shrubby species yield the substance called Tragacanth (q.v.), or Gum Tragacanth.—*A. Boëticus* is cultivated in Hungary, Germany, and other parts of Europe, for its seeds, which are roasted, ground, and used as a substitute for coffee, or mixed with it to improve its flavor.—The Sweet Milk-vetch, or Wild Licorice (*A. glycyphyllos*), a native of Britain and other parts of Europe, perennial, with long and very thick roots, which penetrate deep into the soil, and almost prostrate stems, 3 feet in length, is occasionally cultivated for food of cattle. In the w. and s.w. United States there are various species, including *A. caryocarpus*, the Ground Plum; and *A. Mollissimus*, or 'loco-weed,' which is supposed to have caused the death of many thousand horses and cattle. In Vermont and n. occur 2 highland species.

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ASTRAKANITE, *ăs'tra-kan-ît* [Gr. *astrakanit*—from Astrakhan (q.v.)]: mineral with whitish crystals; same as blœdite.

ASTRAKHAN, *ăs-trâ-kân'*: originally a province of the Mogul empire, but united with the Russian empire, 1554. At present A. forms one of the s.e. governments of Russia in Europe; bounded on the s. by the Caspian Sea and the Caucasus; on the w. by the country of the Don Cossacks; on the n. by the govt. of Saratov; and on the e. by Orenburg: 91,285 sq. m. The province of A. is almost entirely a barren waste, the only fertile portions being the banks of the Volga, which divides the province into two equal parts. Salt is procured from the marshes of the steppes, considerable numbers of cattle are reared, and the annual value of the sturgeon-fishing in the Volga is as much as 2,500,000 roubles (about $2,000,000). The climate varies from 70° F. in summer to 13° in winter. Pop. (1887) 932,539, composed of Russian, Tartar, and a geeat diversity of elments.

ASTRAKHAN': chief town of the govt. of A.; on an island of the Volga, near the Caspian Sea; lat. 46° 21′ n., long. 48° 4′ e. It is the seat of a Greek abp. and an Armenian bp.; has 37 Greek, 2 Rom. Cath, 1 Prot., and 2 Armenian churches; 15 mosques, an Indian temple, a gymnasium, a seminary for priests, a botanical garden, and many manufactories. The houses are mostly of wood, irregularly built. The fisheries in the Volga supply occupation to many inhabitants of A. and its neighborhood. The principal exports are leather, linen, and woolen goods, salted sturgeon, caviar, and isinglass. Imports are chiefly gold-embroidered silken goods from Persia, silk stuffs, woolen goods, rice, rhubarb, raw silk, drugs, etc. From July to Oct. the neighborhood of A. is frequently visited by swarms of locusts. Pop. (1880) 57,700; (1887) 73,710.

ASTRAKHAN: a fine curly kind of fur on the pelts of young lambs, the product of a variety of sheep found in Bokhara, Persia, and Syria.

ASTRAL, *ăs'trăl* [Gr. *aster*, a star]: belonging to the stars; starry. ASTRAL BODY, in Theosophy (q.v.), a sort of spiritual body detachable from man's material body during life, and subsisting after the death of the material body. ASTRAL LAMP, a kind of argand lamp casting an uninterrupted light from under a concave glass. ASTRAL SPIRITS, spirits which, in some eastern religions, were supposed to animate the heavenly bodies. The star and fire worship of the eastern religions rested on the doctrine that every heavenly body is animated by a pervading spirit, as it were, a soul; and this doctrine passed into the religio-physical theories of the Greeks and Jews, and even into the Christian world. In the demonology or spirit-systems of Christendom in the middle ages, Astral Spirits are conceived of sometimes as fallen angels, sometimes as souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth, and hell. Their intercourse with men and their influence were variously represented. In the 15th c., the demonologists, or special students of this subject, systematized the strange fancies

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of that wild period; and A. S. were made to occupy the first rank among evil or demoniacal spirits. Paracelsus, however, and others attributed to every human being an astral spirit, or sidereal element, in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies. ASTRAL LAMP, lamp similar to an Argand lamp (q.v.).

ASTRANTIA, *as-trăn'shĭ-a* [Gr. *astron*, a star; *anti*, here implying comparison with]: Masterwort; genus of plants of order *Umbelliferæ*. Masterwort misapplied to cow-parsnip.

ASTRAPÆA, *ăs'tra-pē-a* [Gr. *astrapaios*, pertaining to lightning]: genus of plants belonging to the order *Sterculiaceæ*, tribe *Dombeyæ*. It has large heads of flowers so splendid in color that they suggested the generic name.

ASTRAY, ad. *ă-strā'* [AS. *a*, on, and *stray*]: out of the right way or proper place.

ASTRICT, v. *ă-strĭkt'* [L. *astrictus*, drawn tight—from *ad*, to; *strĭngo*, I bind]: to bind firmly; to contract. ASTRICTION, n. *ă-strĭk'shŭn*, the act of binding close or contracting; the contraction of parts by the application of medicaments. ASTRICTIVE. a. *ă-strĭk'tĭv*, binding; also ASTRICTORY, a. *ă-strĭk'tĕr-ĭ*.

ASTRIDE, ad. *ă-strīd'* [AS. *a*, on, and *stride*]: with the legs apart.

ASTRIFEROUS, a. *as-trĭf'ĕr-ŭs* [L. *astrum*, a star; *fero*, I bear]: bearing stars; starry. ASTRIGEROUS, *as-trĭj'er-ŭs*, carrying stars.

ASTRINGE, v. *ă-strĭnj'* [L. *astringĕrĕ*, to bind or tie tight together—from *ad*, to; *stringo*, I bind fast]: to bind tightly together; to contract by pressing together. ASTRING'ING, imp. ASTRINGED', pp. *-strĭnjd'*. ASTRINGENT, n. *ă-strĭn'jĕnt* [L. *astrin'gens* or *astringen'tem*, binding or tying fast]: that which contracts or draws together muscular fibre; the opposite of laxative; the principle in bark that tans hides for leather: ADJ. binding. ASTRIN'GENCY, n. *-jĕn-sĭ*, the power of contracting parts, as the soft solids of the body. ASTRIN'GENTLY, ad. *-lĭ*.

ASTRIN'GENTS: medicines used for contracting the animal fibres and canals, so as to check fluxes, hemorrhage, and diarrhea. The drugs most commonly used as A. are alum, catechu, oak-galls, rhatany-root, etc. Many of the vegetable A. owe that property, in whole or in great part, to tannin. A severe degree of cold is a powerful astringent.

ASTRIPOTENT, a. *ăs-trĭp'o-tĕnt* [L. *astrum*, a star; *potens*, powerful]: ruling the stars.

ASTROCARYUM, *ăs-trō-kā'rĭ-ŭm* [from the Gr. *astron*, a star, and *karyon*, a nut]: a genus of Palms, of which about sixteen species are known, natives of tropical America, remarkable for the abundance of acute and formidable spines—in some cases, a foot long—with which almost every part—stem, leaves, spathe, and fruit-stalk—is armed. They have beautiful pinnated leaves; some of them are lofty, others of very moderate height, as 8–15

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ft., while some are almost altogether stemless. The fruit of some species is eatable—a juicy pulp covering a stony seed—as the fruit of the MURUMURÚ palm (*A. Murumuru*), the pulp of which is said to resemble a melon in flavor, has a sort of musky odor, and is highly esteemed. It is 8–12 ft. high, abundant about Pará and elsewhere on the Amazon. Cattle roam the forests in quest of its fruit, and swine fatten on the seed, which they crush with their teeth, although to break it requires a smart blow of a

Tucúm Palm (*A. vulgare*).

hammer, and in hardness it almost resemoles vegetable ivory. Another edible fruit is that of the TUCUMA' palm (*A. Tucuma*), abundant in the same regions. These fruits are about an inch long, the Murumurú ovate, the Tucumá almost globular. The Tucumá palm is 30–40 ft. high, the stem encircled with narrow rings of black spines, which are disposed with beautiful regularity. The TUCÚM palm (*A. vulgare*), a species quite distinct from the Tucumá, and more lofty, is of great importance to the Indians, and in places where it is not indigenous, is cultivated with care on account of the epidermis of its unopened leaves, of which they make cordage, useful for bow-strings, fishing-nets, etc. The fibre is at once fine, strong, and durable, and may perhaps become important as an article of commerce. Beautiful hammocks are made of tucum thread. Martius, in his great work on Palms

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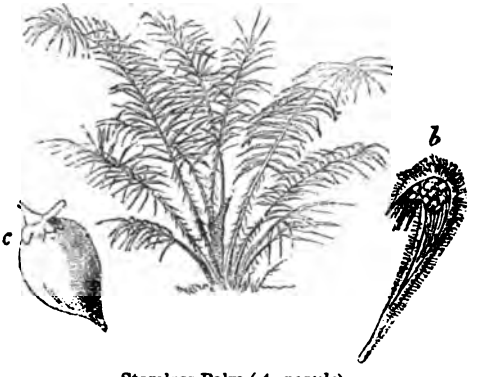
(*Palm Trees of the Amazon*, Lond. 1853), has, by mistake, represented the Tucumá instead of the Tucúm palm as yielding this fibre. The fibre is obtained by cutting down the terminal bud or column of unopened leaves which rises



Stemless Palm (*A. acaule*).
b, spadix, with spathe forming a hood over fruit; *c*, fruit, about one-fifth natural size.

from the centre of the crown of foliage. The tender leaflets are then carefully stripped of their epidermis, in pale, ribbon-like pellicles which shrivel up almost to a thread. These are tied in bundles, and dried, and afterwards twisted into thread, or made into thicker cords, by mere rolling and manipulation.

ASTROGNOSY, n. *as·trŏg'nō·sĭ* [Gr. *astron*, a star; *gnosis*, inquiry, knowledge]: knowledge of the stars.

ASTROGRAPHY, n. *ăs-trŏg'ră-fĭ* [Gr. *aster* or *astron*, a star; *grapho*, I describe]: a description of the stars.

ASTROID, n. *ăs-troyd'* [Gr. *astron*, a star; *eidos*, form]: in *her.*, a mullet.

ASTROITE, n. *ăs-trō'ĭt* [Gr. *astron*, star; *lithos*, stone]: any star stone, i.e., stone of a radiate structure or superficially radiated; specially, an ancient gem, called by Pliny *asteria*. Some have thought this the mineral cat's-eye, others amianthus or asbestos inclosed in quartz. Phillips and Dana regard it as a variety of the sapphire—that sometimes called the *asteriated sapphire*.

ASTROLABE, n. *ăs'trō-lāb* [Gr. *astron*, a star; *labein*, to take]: name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the armillary sphere (see under ARMILLA), were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sight for taking altitudes, was known as an A. in the palmy days of astrology, and was the badge of the astrologer. The A. has been superseded by the instruments of modern astronomy. See QUADRANT: SEXTANT.

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ASTROLATRY, n. *ăs-trŏl'ă-trĭ* [Gr. *astron*, a star, *latreí'a*, worship]: the worship of celestial bodies; star-worship.

ASTROLITHOLOGY, *ăs-tro-lĭ-thŏl'o-jĭ* [Gr. *astron*, a star; *lithos*, a stone; *logos*, a discourse]: the science which treats of meteorites or aerolites.

ASTROLOGY, n. *ăs-trŏl'ŏ-jĭ* [Gr. *astron*, a star; *logos*, discourse]: a science that pretends to foretell events by observing the stars. ASTROL'OGER, n. *-jer*, a person who pretends to foretell events by the stars. ASTROLOGICAL, a. *ăs'trŏ-lŏj'ĭ-kăl*, or ASTROLOGIC, *-ĭk*, pertaining to. AS'TROLOG'ICALLY, ad. *-ĭ-kăl-ĭ*. ASTROLOGIZE, v. *ăs-trŏl'ŏ-jīz*, to practice astrology. ASTROL'OGI'ZING, imp. ASTROL'OGIZED', pp. *-jīzd'*.

ASTROL'OGY: originally nearly the same as *astronomy*, 'the knowledge of the stars'; at length restricted to the science of predicting future events, especially the fortunes of men, from the positions of the heavenly bodies. This was considered the higher, the real science; while the mere knowledge of the stars themselves, their places and motions (astronomy), was, till recently, cultivated mostly with a view to (judicial) astrology. A. is one of the most ancient forms of superstition; it prevailed among the nations of the East (Egyptians, Chaldæans, Hindus, Chinese) at the very dawn of history. The Jews became much addicted to it after the captivity. It spread into the West and to Rome at about the Christian era. Astrologers were an important class at Rome, where they were called Chaldæans and Mathematicians; and though often banished by the senate and emperors under pain of death, and otherwise persecuted, they held their ground. The Roman poet Manilius, author of an astronomical poem still extant, was addicted to A.; and even Ptolemy the astronomer did not escape the infection, which in his time had become universal. A., which accords well with the predestinarian doctrines of Mohammedanism, was cultivated with great ardor by the Arabs from the 7th to the 13th c. Some of the early Christian fathers argued against the doctrines of A., others received them in a modified form. In its public capacity the Roman Church several times condemned the system; but many zealous Rom. Catholics have cultivated it. Cardinal d'Ailly, 'the Eagle of the doctors of France,' (d. 1420), is said to have calculated the horoscope of Jesus Christ, and maintained that the deluge might have been predicted by A. For centuries the most learned men continued devoted to this delusive science; Regiomontanus, the famous mathematician Cardan, even Tycho Brahé and Kepler could not shake off the fascination. Kepler saw the weakness of A. as a science, but could not bring himself to deny a certain connection between the positions ('constellations') of the planets and the qualities of those born under them. The Copernican system gave the death-blow to A. When the earth itself was found to be only one of the planets, it seemed absurd that all the others should be occupied in influencing it. The argument has

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really little force, but it produced the effect. Belief in A. is not now ostensibly professed in any Christian country, though a few solitary advocates have from time to time appeared, as J. M. Pfaff in Germany, *Astrologie* (Bamb. 1816); and ignorant impostors use it to get money from the superstitious. But it still holds sway in the East, and among Mohammedans everywhere. Even in Europe the craving of the ignorant for divination is still gratified by the publication of multitudes of almanacs containing astrological predictions, though the writers no longer believe in them.

Many passages of old writers are unintelligible without some knowledge of astrological terms, numbers of which have taken root in the language. In the technical rules by which human destiny was foreseen, the heavenly *houses* played an important part. Astrologers were by no means at one as to the way of laying out those houses. A very general way was to draw great circles through the n. and s. points of the horizon, as meridians pass through the poles, dividing the heavens, visible and invisible, into twelve equal parts—six above the horizon, and six below. These were the twelve houses, and were numbered onward, beginning with that which lay in the e. immediately below the horizon. The first was called the house of life; the second, of fortune, or riches; the third, of brethren; the fourth, of relations; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death; or the upper portal; the ninth, of religion; the tenth, of dignities; the eleventh, of friends and benefactors; the twelfth, of enemies, or of captivity. The position of the twelve houses for a given time and place—the instant of an individual's birth, for instance—was a *theme*. To construct such a plan was to *cast* the person's nativity. The houses had different powers, the strongest being the first; as it contained the part of the heavens about to rise, it was called the *ascendant*, and the point of the ecliptic cut by its upper boundary was the *horoscope*. Each house had one of the heavenly bodies as its *lord*, who was strongest in his own house.

ASTROMETEOROLOGY, *ăs-trŏ-mē-tĕ-or-ŏl'o-jĭ* [Gr. *astron*, a star; *meteōrologia*—from *meteōros*, meteor; *logos*, discourse]: the investigation of the influence exerted by sun, moon, and stars upon the weather. The sun exerts transcendent influence; but there is no ground for the common notion that changes of the moon effect changes in the weather; and no such influence is traceable to the stars.

ASTROMETER, n. *ăs-trŏm'ĕ-tĕr* [Gr. *astron*, a star; *metron*, a measure]: an instrument devised for comparing the brightness of stars. ASTROM'ETRY, n. *-ĕt-rĭ*, measurement and numerical expression of the apparent magnitude of the fixed stars.

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ASTRONOMY, n. *ăs-trŏn'ŏ-mĭ* [Gr. *astron*, a star; *nomos*, a law]: the science that treats of everything connected with the heavenly bodies. ASTRONOMER, n. *ăs-trŏn'ŏ-mĕr*, one given to the study of the heavenly bodies. ASTRONOMIC, a. *ăs'trō nŏm'ĭk*, or AS'TRONOM'ICAL, a. *-nŏm ĭ-kăl*, pertaining to. AS'TRONOM'ICALLY, ad. *-lĭ*. ASTRONOMIZE, v. *ăs-trŏn'ŏ-mīz*, to assume the habits and study of an astronomer. ASTRON'OMI'ZING, imp. ASTRON'OMIZED', pp. *-mīzd'*.

ASTRON'OMY: science of the heavenly bodies; properly divided under three heads. 1. *Geometrical or Mathematical A.*, including the exact determination of the numerical and geometrical elements of the heavenly bodies—that is, their distances, shapes, magnitudes, the figures that they describe in their motions, etc. 2. *Physical A.*, or the nature of the powers or forces that carry on the heavenly motions, the laws that they observe, and the calculation of the motions from a knowledge of these laws. 3. *Sidereal A.*, or whatever is ascertained regarding the universe of the fixed stars. *Practical A.* might form another division, which would include a knowledge of the various astronomical instruments; and a familiarity generally with the rules and calculations by which the requisite results are deduced from observations.

For parts of this extensive subject, see ABERRATION OF LIGHT: AEROLITES: CIRCLE: COMET: ECLIPSES: EQUATOR: LIBRATION: METEORS: MOON: NEBULÆ: PARALLAX: PLANETOIDS: PLANETS: PRECESSION: REFRACTION: SOLAR SYSTEM: STARS: SUN: TRANSIT INSTRUMENT: etc. See also the principal names mentioned in the brief sketch of the history of astronomical discovery which follows here.

The history of A. dates from a very early period. It is the most ancient of all the sciences. The Chinese, Hindus, Chaldæans, Egyptians, and even the Greeks, are known to have investigated the heavens very long before the Christian era. But with the first four nations, A. may be said to have been a sentiment rather than a science—a vague notion built up out of crude speculations, rather than a correct theory founded on systematic observation. In China, A. was intimately associated with state politics; the Indians, Chaldæans, and Egyptians made it a matter of religion; and each of these nations applied it to astrological purposes. In Greece alone was it prosecuted for its own sake.

The Chinese, Chaldæans, Hindus, and Egyptians each claim the honor of having been the first students of A., and each has had advocates of its claim. The Tirvalore tables (asserted by the Hindus to belong to an epoch of B.C. 3102—the commencement of the Cali-yug, or iron age, of their mythology—at which period a conjunction of the sun, moon, and planets is said to have occurred) are, so far as their date is concerned, altogether untrustworthy. Modern calculations have conclusively proved that no such conjunction could possibly have taken place at the time specified; and the elements of the tables are, in the general opinion of scientific men, of a character far in advance of the actual observations of that period. There is no doubt

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that the epoch is fictitious—that the date of these tables is fixed much earlier than their internal evidence justifies; but it is a question whether they were the result of the observations of Hindus themselves at some later period before the Christian era, or whether they were constructed after that era from data furnished to them by the Arabs or Greeks. Those who hold the former view, quote the well-known mathematical attainments of the Indians, and their aversion to intercourse with foreigners, as arguments in its favor; those who support the latter, point out that the tables are a mean between those of Ptolemy and Albategnius, or Al Batani, a distinguished Arabian astronomer, and therefore likely to have been derived from these two sources. Those who are interested in the question of the originality of these tables, may refer to Delambre, and to Bailly's *Hist. de l'Astronomie Indienne.*

The Chinese have astronomical annals claiming to go back to B.C. 2857. In these there is little record of anything but of the appearance of comets and solar eclipses; and regarding the latter phenomena, they tell nothing, save the fact and date of their occurrence. Professional astronomers were compelled to predict every eclipse under pain of death. The popular idea was, that an eclipse was a monster having evil designs on the sun, and it was customary to make a great noise, by shouting, beating of gongs, etc., in order to frighten it away from its solar prey. The many eclipses which the Chinese report have been recalculated, but not more than one anterior to the time of Ptolemy could be verified. At an early period, however, the Chinese appear to have been acquainted with the luni-solar cycle of nineteen years (introduced into Greece by Meton, and since known as the Metonic Cycle), and they had also divided the year into 365¼ days. Solstitial observances are said to have been made by means of a gnomon, B.C. 11th c. To the burning of all scientific books by one of their princes (Tsin-Chi-Hong-Ti), B.C. 221, the Chinese attribute the loss of many theories or methods previously in use. The precession of the equinoxes was not known to the Chinese until A.D. 400, but long before that they were familiar with the motion of the planets.

The mass of evidence points to the plains of Chaldæa as the primal seat of observative A. The risings and settings of the heavenly bodies and eclipses were subjects of observation and notation by their priests at a very remote period. Simplicius and Porphyry mention that there was transmitted to Aristotle from Babylon, by order of Alexander the Great, a catalogue of eclipses observed during 1,903 years preceding the conquest of that city by the Macedonians. Ptolemy gives six of the eclipses from this catalogue, but the earliest does not extend further back than B.C. 720. The probability therefore is, that the statement of Simplicius, as to their early date, is an exaggeration. In these observations, the time is given only in hours, and the part of the diameter eclipsed within a quarter; but rough as they are, they are the earliest trustworthy observations extant; and a comparison of them

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with modern observations led Halley to the discovery of the doctrine of the moon's acceleration—that is, that she now moves round the earth with greater velocity than formerly. It is remarkably illustrative of the Chaldæan habit of diligent observation, that the Chaldæans were acquainted with the cycle of 6,585¼ days, during which the moon makes about 223 synodical revolutions, and experiences the same number of eclipses, alike, too, in order and magnitude, comparing cycle with cycle. The clepsydra as a clock, the gnomon for determining the solstices, and a hemispherical dial for ascertaining the positions of the sun, were used by the Chaldæans, and they have the credit of the invention of the zodiac and the duodecimal division of the day.

The Egyptians, it is supposed, were the first instructors of the Greeks in A. They do not, however, appear to have observed much for themselves. The meaning of what data they have left behind them can be guessed at in only a few instances. No mention is made by Ptolemy of the idea ascribed to them, that the planets Mercury and Venus moved round the sun; the probability therefore is, since Ptolemy was not likely to overlook such a novel theory, that they entertained no such notion at the time of his visit, but that it is an after-thought of later ages. From the accuracy with which some of the pyramids face the cardinal points, there is a supposition that they must have been erected for astronomical purposes; but if it be true, as is stated, that Thales taught the Egyptians how to find the height of the pyramids by the shadow, and that the latter informed Herodotus that the sun had twice been seen to rise in the west, the conclusion is that the A. of the ancient Egyptians was very meagre and absurd.

Before this point of history, A. is little else than tradition. The Greeks have the honor of elevating it into the dignity of a science. Thales (B.C. 640), founder of the Ionic school, laid the foundation of Greek A. He it was who first set forth the theory of the earth's sphericity. The sphere he divided into five zones. He predicted the year of a great solar eclipse, but this it is now supposed he must have casually succeeded in doing—the Greeks at this time having no observations of their own to guide them—by means of the Chaldæan Saros, or period of eighteen years and ten days, which gives a regular recurrence of eclipses. He made the Greeks, who, prior to his time, were content to navigate their vessels by the Great Bear—a rough approximation to the north—acquainted with the lesser constellation of that name, a much better guide for the mariner. His system, however, contained much absurdity. Among other things, he held that the stars were composed of fire, and that the earth was the centre of the universe. The successors of Thales held opinions which in many respects are wonderfully in accordance with modern ideas. Anaximander, it is said, held that the earth moved about its own axis, and that the moon's light was reflected from the sun. To him is also attributed, on somewhat slender authority, the belief in the grand idea of the plurality of

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worlds. Anaxagoras, who transferred the Ionic school from Miletus to Athens, is said to have offered a conjecture that, like the earth, the moon had habitations, hills, and valleys.

Pythagoras (B.C. 500), the next astronomer of eminence, was far in advance of his predecessors. He promulgated, on grounds that were fanciful, the theory, since established, that the sun is the centre of the planetary world, and that the earth circulates round it. Pythagoras also first taught that the morning and evening star were in reality one and the same planet. But the views of Pythagoras met with little or no support from his successors until the time of Copernicus. Between Pythagoras and the advent of the Alexandrian school, nearly a couple of centuries later, the most prominent names in astronomical annals are those of Meton (B.C. 432), who introduced the luni-solar cycle, and in conjunction with Euctemon observed a solstice at Athens, B.C. 424; Callippus (B.C. 330), who improved the Metonic cycle; Eudoxus of Cnidus (B.C. 370), who brought into Greece the year of 365¼ days, and wrote some works on A.; and Nicetas of Syracuse, who is reported to have taught the diurnal motion of the earth on its axis.

To the Alexandrian school, owing its existence to the munificent Ptolemies, the world owes the first systematic observations in A. Hitherto the truths of A. rested on no better evidence than the conjectures of sagacious minds, and these being opposed to the testimony of the senses, met with but little acceptance from the world. The Alexandrian school originated a connected series of observations relative to the constitution of the universe. The positions of the fixed stars were determined, the paths of the planets carefully traced, and the solar and lunar inequalities more accurately ascertained. Angular distances were calculated with instruments suitable to the purpose by trigonometrical methods, and ultimately the school of Alexandria presented to the world the first system of theoretical astronomy that had ever comprehended an entire plan of the celestial motions. The system we know to be false, and inferior to the Pythagorean notions; but it had the merit of being founded upon a long and patient observation of phenomena, a principle which finally brought about the destruction of the system, while the previous theories were the results of mere hypothesis.

The most interesting points in the early history of the Alexandrian school are the attempts made to determine the distance of the earth from the sun, and the magnitude of the terrestrial globe. Aristarchus of Samos—the pioneer of the Copernican system, as Humboldt calls him—is the author of an ingenious plan to ascertain the former. See ARISTARCHUS OF SAMOS.

Among the eminent members of this school were Timocharis and Aristyllus, who made the observations which, together with observations of Hipparchus (q.v.) enabled the latter to discover the precession of the equinoxes; Eratosthenes (q.v.), the first who attempted to determine on true principles the magnitude of the earth, and to clear, as

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Humboldt expresses it, 'the description of the earth from its fabulous traditions'; and Autolycus, whose books on A. are the earliest extant in the Greek language.

With Hipparchus of Bithynia (B.C. 160–125), far the greatest name of all in astronomical science down to that period, begins the real written history of scientific A.; for not until his era were there facts verified and sufficient in number on which to build a system. Hipparchus was at once a theorist, a mathematician, and an observer. He catalogued no less than 1,081 stars—the first trustworthy catalogue that we have. He discovered the precession of the equinoxes; he determined, with greater exactitude than his predecessors had done, the mean motion, as well as the inequality of the motion of the sun; also the length of the year. He determined the mean motion of the moon, her eccentricity, the equation of her centre, and the inclination of her orbit; and he suspected the inequality afterwards discovered by Ptolemy (the evection). He invented processes analogous to plane and spherical trigonometry, and was the first to use right ascensions and declinations, which he afterwards abandoned in favor of latitudes and longitudes.

For more than two centuries and a half after the demise of this indefatigable astronomer, no name of note appears. Ptolemy (A.D. 130–150) is the next who rises above the mass of mediocrities. Besides being a practical astronomer, he was accomplished as musician, geographer, and mathematician. His most important discovery in A. was the libration or evection of the moon. He also was the first to point out the effect of refraction. He extended and improved many of the theories of Hipparchus, and was the founder of the false system known by his name, universally accepted as the true theory of the universe, until the researches of Copernicus overthrew it. The Ptolemaic system, expounded in the *Great Collection*, or, as it was called by the Arabs, the *Almagest*—from which source most of the modern knowledge of Greek A. is derived—placed the earth immovable in the centre of the universe, making the entire heavens revolve round it in the course of twenty-four hours.

With Ptolemy closes the originality of the Greek school. His successors were men of no mark, confining themselves for the most part to astrology, or to comments on earlier writers. To the Arabs are due the next advances in A. They commenced making observations A.D. 762, in the reign of the Caliph Al Mansur, who gave great encouragement to science, as did also his successors, the 'good Haroun Alraschid' and Al Mamoum, both of whom were diligent students of A. For four centuries, the Arabs prosecuted the study of the science with assiduity, but they are meritorious chiefly as observers. They had little capacity for speculation, and throughout held the Greek theories in superstitious reverence. They, however, determined with much more accuracy than the Greeks had done the precession of the equinoxes, the obliquity of the ecliptic, and the solar eccentricity; and the length of the tropical

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year was ascertained within a few seconds of the truth. The most illustrious of the Arabian school were Albategnius or Al Batani (880), who discovered the motion of the solar apogee (see ANOMALISTIC YEAR), and who was also the first to make use of sines and versed sines instead of chords; he corrected the Greek observations, and was altogether the most distinguished observer between Hipparchus and the Copernican era; and Ibn-Yunis (1000), an excellent mathematician, who made observations of great importance in determining the disturbances and eccentricities of Jupiter and Saturn, and who was the first to use cotangents and secants.

In northern Persia, an observatory was erected by a descendant of the renowned warrior Genghis Khan, where some tables were constructed by Nasir-Eddin; and at Sarmacand, Ulugh Beg, a grandson of Timur, made, 1433, many observations, and the most correct catalogue of stars which, down to his time, had been published.

In the 13th c., A. was again introduced into western Europe, the first translation from the *Almagest* being made under the emperor Frederick II. of Germany, abt. 1230; and in 1252 an impulse was given to the science by the formation of astronomical tables under the auspices of Alfonso X. of Castile. An Englishman, named Holywood (Sacrobosco), 1220, wrote a book of great repute in its day on the spheres, chiefly abridged from Ptolemy; and among others who did much to promote a taste for A. were Purbach (1460), Regiomontanus (John Muller, died 1476), and Waltherus, pupil of the latter, who made numerous observations of merit.

At this point comes into view the illustrious name of Copernicus (1473–1543), to whom was reserved the grand honor and the danger—for there is ever danger in bringing old notions into disrepute by introducing new truth—of disproving the Ptolemaic idea, and of promulgating a correct though imperfect theory of the universe. His system is in some part a revival and systematic application of the opinions said to have been held by Pythagoras. It makes the sun the immovable centre of the universe, around which all the planets revolve in concentric orbits, Mercury and Venus within the earth's orbit, and all the other planets without it. In the Copernican theory, there remained many of the old notions since shown fallacious. It is a current belief that Copernicus, afraid to state boldly such heterodox views of the universe as those he entertained, gave them forth in the form of an hypothesis. Humboldt (*Cosmos*, vol. ii. p. 345), denies that he did so. This distinguished authority says: 'The language of Copernicus is powerful and free, and bursts forth from his inmost convictions, and thus sufficiently refutes the ancient opinion, that he has brought forward the system which is immortalized by his name, as a hypothesis made for the convenience of calculating astronomers, or as one which has but a probable foundation.' The same author also refutes the popular notion that Copernicus died a few hours after receiving a printed copy of his book. He was broken down

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in body and mind when his work *On the Revolutions of the Heavenly Bodies* was brought to him, but he did not die until 'many days afterwards, 1543, May 24.'

Among the contemporaries of Copernicus were Rheinhold, who constructed the Prutenic tables; Recorde, the first to write on A. in English; and Nonius, a Portuguese, who invented a method for dividing the circle. The study of A. was also much aided about this time by the liberality of the Landgrave of Hesse-Cassel, William IV.

Decidedly the most industrious observer and eminent practical astronomer from the time of the Arabs to the latter half of the 16th c. was Tycho Brahé (1546-1601). Considerable odium attaches to him on account of his repudiation of the Copernican system, but it should not be forgotten that in the time of Tycho that system was not supported by the conclusive evidence which now renders it unquestionable. Tycho's system, which made the sun move round the earth, and all the other planets round the sun, they moving with it round the earth, explained all natural phenomena then observed equally well, while it must have appeared more probable than the crude and, at that era, undemonstrable theories of Copernicus. Tycho Brahé compiled a catalogue of 777 fixed stars, more nearly perfect than any previous. He made the first table of refractions, and discovered the variation and annual equation of the moon, the inequalities of the motion of the nodes, and the inclination of the lunar orbit, and rejected the trepidation of the precession, which had hitherto injuriously affected all tables. He also made some interesting cometary investigations.

To his researches are mainly due the discovery by Kepler (1571-1630) of those famous laws which have rendered his name immortal. See KEPLER. To Kepler is due the credit of divesting the Copernican system of its absurdities. Kepler is also said to have had some notion of the law of gravitation.

Galileo Galilei (1564-1642) first applied to the investigation of the heavens the telescope, which he made from a general description of the instrument of Hans Lipperhey of Holland, first inventor of the telescope. He was rewarded by the discovery of the inequalities on the moon's surface. The important discoveries of the four satellites of Jupiter, the ring of Saturn—not then distinctly recognized as a circle—the spots on the sun, and the crescent form of Venus, followed in quick succession. For propagating the Copernican doctrine of the universe, Galileo incurred the displeasure of the Roman Church, and was compelled by the Inquisition to retract his opinions.

But the eternal laws of nature are not to be suspended by the recantation of a philosopher forced by the tyranny of priestcraft. The earth moved onward round the sun in spite of both; and scientific truth was now too old to remain in the restrictive leading strings of any ecclesiasticism.

The next great epoch in the history of A. brings into view England and Newton (1642-1727). In the interval,

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practical A. had profited largely by the logarithms of Napier; the mathematical researches of Descartes; the application of the telescope to the quadrant by Gascoigne, an Englishman, and afterwards by Auzout and Picard; by Römer's discovery of the progressive motion, and measurement of the velocity, of light; by the invention of Vernier; and the application of the pendulum to clocks by Huygens, who also brought into use the spiral spring, and made some valuable observations on the ring and satellites of Saturn; as well as by the investigations of Norwood, Horrocks, Hooke, Hevelius, Gilbert, Leibnitz, and Dominicus Cassini, to the last of whom especially the scientific world owes much. Among a variety of valuable observations and discoveries may be mentioned his thorough investigation of the zodiacal light, his determination of the rotations of Jupiter and Mars, and of the motions of Jupiter's satellites from their eclipses, his discovery of the dual character of Saturn's ring; also of four of his satellites. Newton's fame rests upon his discovery of the law of gravitation, upon which the common belief is that he was led to speculate by the fall of an apple. Newton announced his discovery in the *Principia*, 1687, which was briefly that every particle of matter is attracted by, or gravitates to, every other particle of matter, with a force inversely proportioned to the squares of their distances. The first gleam of this grand conclusion is said to have so overpowered Newton that he had to suspend his calculations, and to call in a friend to finish the few arithmetical computations that were incomplete. This discovery is perhaps the grandest, certainly the most impressive, recorded effort of human genius. Newton made also the important discovery of the revolution of comets round the sun in conic sections, proved the earth's form to be an oblate spheroid, gave a theory of the moon and tides, invented fluxions, and wrote upon Optics.

While the foundations of physical A. were thus broadly laid by Newton, Flamsteed—the first astronomer royal at Greenwich, to whom, until recently, scant justice has been done—and Halley, were greatly improving and extending the practical department of the science. To the former we are indebted for numerous observations on the fixed stars, on planets, satellites, and comets, and for a catalogue of 2,884 stars. His *Historia Cœlestis* formed a new era in sidereal A. Dr. Halley, who succeeded Flamsteed as astronomer royal, discovered the accelerated mean motion of the moon, and certain inequalities in Jupiter and Saturn, but he is most famed for his successful investigations into the motions and nature of comets. His successor was Dr. Bradley, who, in the year of Newton's death, made the important discovery of the aberration of light, which furnishes the only direct and conclusive proof we have of the earth's annual motion. To him also we are indebted for our knowledge of the nutation of the earth's axis. He was, besides, an unwearied observer, and left behind him at his death upwards of 60,000 observations. Altogether, Bradley's is deservedly one of the most honored names in mod-

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ern A. Dr. Maskelyne, who was appointed to the observatory after Bradley, originated the *Nautical Almanac*.

Merely to mention the names of men who from the death of Bradley to the present time have added, by theory and observation, to the knowledge of A., would extend this synopsis much beyond due limit. The 18th c., which opened with lustre derived from the physical demonstrations of Newton, closed magnificently with the telescopic discoveries of Sir William Herschel, who added to our universe a primary planet (Uranus) with its satellites, gave two more satellites to Saturn, resolved the milky-way into countless myriads of stars, and unravelled the mystery of nebulæ and of double and triple stars. Laland, Lagrange, Lacaille, and Delambre, in the latter half of the 18th c., did much by their researches and analyses to systematize and improve the science of A. The instrumental means of observation were also, during that time, brought to high perfection. Laplace, in his great work the *Mécanique Céleste* (1799–1808), gave what further proof was needed of the truth and sufficiency of the Newtonian theory.

The 19th c. opened with the discovery of the four small planets—Ceres (1801), by Piazzi; Pallas (1802), and Vesta (1807) by Olbers; and Juno, by Harding, 1804. In 1845, Hencke discovered the fifth of this group revolving between Mars and Jupiter, to which the name of Astræa was given; and by the end of 1892, 357 planetoids (q.v.) had been discovered. The greatest events of the century have been the discovery of the planet Neptune 1846, and the photographing of the heavens.

Observations upon Uranus had shown the motions of that planet to present great irregularities, which could not be explained by the action of Jupiter and Saturn; and after carefully examining the analytical theory of Uranus, Leverrier, a young academician of France, in the summer of 1846, published the elements of an undiscovered planet, the cause of the perturbations. He boldly declared its existence, calculated its mass, and referred to its place in the heavens; and scarcely a month afterwards, Sep. 23, the hitherto concealed object (Neptune) was found by M. Galle of Berlin. It has been only by accident that France has the honor of this remarkable achievement. Mr. Adams of Cambridge, Eng., had arrived at results more perfect than those of Leverrier, and had communicated them to Mr. Challis, professor of A. at Cambridge, 1845, Sep., a year before the discovery of the planet, and nearly a year before the publication of Leverrier's final calculations. Mr. Challis, it appears, commenced a search for the planet, July 29; and, Aug. 4 and 12, he actually seized the planet, and recorded two positions of it, but did not recognize it, through not comparing his observations, which a pressure of occupation, and an impression that the discovery required a much more extensive search, prevented. But for this, and the non publication of the Cambridge mathematician's results at the time they were forwarded to Sir George Airy, 1845, Oct., the honorable position of M. Leverrier would have been occupied by Mr. Adams, and that of M. Galle by Mr. Challis.

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Among the astronomical phenomena that in the 19th c. have engaged the attention of astronomers, the spots on the sun hold a chief place. Galileo, as we have seen, discerned these spots, but the credit of having been the first to notice them is in dispute between him and four of his contemporaries. Systematic and continuous observation of sun spots were made by Schwabe of Dessau during 46 yrs., 1826–72. The periodicity of the phenomena was soon discovered by Schwabe: he found that the spots wax and wane in frequency in a period of about 11 years. The tables prepared by Schwabe suggested to others a relation between sun spots and magnetic declination—a fact simultaneously noted by several physicists. A relation was also discovered to exist between the sun spot period and auroral phenomena. Prof. Loomis of Yale College finds that the auroral maximum generally occurs a little later than the magnetic maximum. He infers that a sun spot is a result of a disturbance of the sun's surface, which is accompanied by an emanation of some influence from the sun, which is almost instantly felt upon the earth in an unusual disturbance of the earth's magnetism, and a flow of electricity, developing the auroral light in the upper regions of the earth's atmosphere.—Spectrum analysis has in our day yielded results unimaginable to astronomers of an earlier period. When the telescope brought within the reach of vision celestial objects not discernible by the unaided eye, it might well have been believed that in the development of that instrument, and there alone, lay the hope of enlarging man's knowledge of the starry heavens. But the spectroscope analyzes the physical constitution of the most distant orbs, determining their chemical composition, or at least giving evidence of the presence in them or the lack of elements found in our own globe. So, too, the spectroscope pronounces infallibly on the state, whether solid, liquid, vaporous, or gaseous, of distant bodies. The improved methods of analysis and the marvellous advance in the construction of optical and other philosophical instruments, have enabled astronomers to attack the problems of binary or of multiple stars, and to decide whether such groups form systems revolving about one another or around a common centre; of variable stars; the proper motions of stars; the translation of the solar system in space; the constitution of the nebulæ; the nature of the sun's spots and faculæ; the phenomena presented by the solar envelope in eclipses; and the like.—Dr. John William Draper of New York was a pioneer in astronomical photography. His first success was had in obtaining a distinct photograph of the fixed lines in the solar spectrum; he next photographed the moon, 1840. Draper's photograph of the moon was without a parallel till 1889, when, by the aid of the large instrument of the Lick Observatory, Mt. Hamilton, Cal., an image of our satellite, having a diameter of 5 in., was obtained. But in 1890 the two brothers Paul and Prosper Henry of Paris, instead of receiving the image of the moon direct from the telescope on a photographic plate, made it first traverse another lens, which magnified it to 15 diameters; this magnified image was then photo-

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graphed in sections. Dr. Henry Draper, son of John William D., photographed the great nebula in the constellation Orion 1880. Three years later the same nebula was photographed with the most brilliant success by Dr. Commons of Ealing, Eng. Photography has materially helped to solve many problems regarding the constitution of the sun.—As early as 1860 Lewis M. Rutherfurd of New York recognized the great service that might be rendered by photography in constructing maps of the stars, but the suggestion was for a time resultless, and was not acted on till 1882 (and then not intentionally), when Dr. David Gill of the Cape Observatory made his celebrated photograph of the greater comet of that year. The photograph showed distinctly a number of stars down to the 9th magnitude. Two years later stars down to the 16th magnitude were photographed by the brothers Henry of Paris; their photograph of the Pleiades showed 1,421 stars in the neighborhood of that constellation; it also showed a nebula surrounding one of the principle stars, though no nebula had ever been detected by the eye, even when assisted by the most powerful optical instruments. N. B. Wolf of the Paris Observatory had then devoted the whole of 3 years to preparing a chart of the stars in Pleiades, but had catalogued no more than 671 stars. The photograph, exhibiting with the most unimpeachable accuracy 1,421 stars, was the work of three hours. With instruments of still greater precision and delicacy, other photographs have been obtained which show that the constellation Pleiades presents an almost continuous field of nebulous matter. The value of Prof. Rutherfurd's suggestion was thus demonstrated and a stellar map of the whole heavens was projected. An international congress of astronomers was called to meet in Paris 1887 to consider ways and means of executing the project. The congress appointed a commission to procure the construction of a photographic stellar map. The work of constructing the map was allocated in sections to the astronomers of different countries. Each section photograph is to represent the stars in an area of 4 sq. degrees. Before the map is completed no less than 22,000 plates will have been exposed to the sky, each for about an hour. Since 1883 Dr. Edward C. Pickering of the Harvard College Observatory has been engaged in the work of determining the light and color of stars by photography. Photography was first employed in observing a solar eclipse 1869, and by its aid it was proved beyond question that the corona is a solar, not a terrestrial phenomenon.—As a means of determining the proper motion of stars spectroscopic analysis has proved to be of great service. If a star is receding from the point where the observer stands, the wave-length of any portion of its light must be apparently lengthened; if it is approaching, the wave-length must be shortened. The English astronomer Huggins has in this way recognized in some of the brighter stars motions of recession or approach amounting in some cases to 30 or 40 miles per second.—Since the opposition of Mars (1877) that planet has been an object of special study. At that opposition Prof. Asaph Hall of

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Washington discovered the two pygmy moons of Mars, and Prof. Schiaparelli of Milan began that series of studies of the planets' surface which led to his discovery that Mars is covered in its equatorial and temperate zones with a network of straight dark lines which he calls 'canals.' See also the following:

ACCELERATION, ALTAZIMUTH, APHELION, APSIS, ASCENSION RIGHT, CONSTELLATION, COPERNICAN SYSTEM, CYCLE, DAY, EARTH, ECLIPTIC, ELEMENTS, EQUATORIAL, EQUINOXES, GALAXY, GRAVITATION, HARVEST MOON, HORIZON, KEPLER'S LAWS, LAT. AND LONG., LUNAR THEORY, MERIDIAN, MURAL CIRCLE, NODES, NOTATION, OBSERVATORY, OCCULTATION, ORBIT, ORRERY, PENUMBRA, PERIGEE, PERIHELION, PERIOD, PERTURBATION, PHASES, PHOTOGRAPHY CELESTIAL, PTOLEMAIC SYSTEM, SATELLITES, SEASONS, SOLSTICE, TWILIGHT, YEAR, ZODIAC, ETC.

ASTROPHOTOMETRICAL, a. *ăs·tro-fō-too-mĕt'rĭk-ăl* [Gr. *astron*, a star; *phos*, light; *metron*, a measure]: pertaining to the measurement of the light which reaches the earth from the several stars.

ASTROPHYTON, n. *ăs·tro-fī'tŏn* [Gr. *astron*, a star, *phuton*, that which has grown]: genus of star-fishes, containing the Shetland Argus.

ASTROSCOPE, n. *ăs'tro skōp* [Gr. *astron*, a star; *skopeō*, to look at]: astronomical instrument for representing the relative position of the stars, as delineated on two cones. A celestial globe, however, is more accurate and more convenient.

ASTROTHEOLOGY, *ăs·tro-thē-ŏl'o-jĭ* [Gr. *astron*, a star; *theologia*, theology]: theology founded on what is known of the heavenly bodies and the laws which regulate their movements.

AS'TUR: see FALCONIDÆ: GOSHAWK.

ASTURIAS, *ăs-tōō'rē-ăs* (now OVIEDO, *ō-vē·ā'dō*): a northern province of Spain; bounded e. by Santander, s. by Leon, w. by Galicia, n. by the Bay of Biscay. The low hills of Leon and Old Castile rise gradually to the mountain-chain which forms the s. boundary, and towers to about 11,000 ft. in the summit *Peña-de-Peñaranda*. The main road from Leon to Oviedo passes over the mountain-chain at Pajares. The n. slopes are broken by steep and dark valleys or chasms, which are among the wildest and most picturesque in Spain. The summits of the mountains are covered with snow even as late in the year as August. The climate is damp: clouds hang almost continually about the peaks, gathering to them the fogs of the Atlantic. From the mass of calcareous rock, marble crags rise from 200 to more than 400 ft. The principal kinds of wood are oak, chestnut, silver and Scotch firs. In the remoter districts are some superb forests. Alpine pasturage decks the slopes, and a richer covering of green is found in the narrow valleys. In the wider valleys, the soil yields barley, wheat, maize, figs, olives, grapes, oranges. The coasts have good fisheries. The chief minerals of the province are copper, iron, lead, cobalt, arsenic, antimony, and coal. The pasturage of the higher valleys supports an excellent breed of horses, with numerous horned cattle.

A. was never firmly occupied by the Arabs, but afforded a place of refuge to the Goths in the 8th c. Here the fa-

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mous Pelayo was made king, A.D. 718; and his successors, after contending successfully against the Arabs, were made kings of Leon in the 10th c. The Asturian still boasts of his independence as a free hidalgo, and is simple in manners, and brave, but less industrious and sociable than his neighbors in Biscay and Galicia. Many Asturians leave their province to seek a livelihood in other parts of Spain, and after saving money return to dwell among their native hills and valleys. They have been termed the Swiss of Spain; and they are equally faithful and fond of money Among them, the *Vaqueros* form a distinct caste, intermarrying among themselves, and leading a nomadic course of life, spending the winter on the sea-coast, and the summer on the hills of Leytariegos. OVIEDO, the cap. of A., has, since 1833, given its name to the whole province.

The eldest son of the Spanish king has the title of Prince of A., professedly an imitation of the English Prince of Wales, having been taken at the solicitation of the Duke of Lancaster in 1388, when his daughter married the eldest son of Juan I. Area of A., 4,091 sq. m.; pop. (1887) 595,420.

ASTUTE, a. *ăs-tūt'* [L. *astūtus*, crafty—from L. *astus*, craft, cunning; may be connected with Gr. *astu*, a city, thus meaning one having the shrewdness and cunning of the city]: sagacious; sharp; discerning; crafty. ASTUTE'NESS, n. shrewdness; cunning. ASTUTE'LY, ad. *-lĭ*.—SYN. of 'astute': cunning; wily; crafty; penetrating; sly; subtle; sagacious; shrewd; keen.

ASUNCION, *ä-sōn-se-ōn'*, NUESTRA SEÑORA DE LA, or ASSUMP'TION: city, cap. of Paraguay, on the w. bank of the Paraguay river; lat. 25° 16′ s., lon. 52° 42′ w. It has a trade in hides, tobacco, wax, and Paraguay tea. It was founded, 1535, by the Spanish, and soon became a place of importance, though not of beauty, being ill-built and dirty. The houses are scarcely better than huts; even the government residence is of one story. The surrounding country is rich in pastures, and produces wheat, maize, sugar, tobacco, honey, wax, etc. A. has much commerce by the river, and important railway connections s. and w. Pop. abt. 22,000.

ASUNDER, ad. *ă sŭn'dĕr* [AS. *a*, on, and *sundor*]: apart; separately; in a divided state.

ASURA, n. *a-sūr'a* [Skr.]: a demon; an enemy of the gods. The name seems to have been given at one time to the Turanian aborigines in conflict with the Aryan invaders of India, and at another to the Buddhist religionists in conflict with the professors of the Brahminic faith.

ASYLUM, n. *ă-sī'lŭm*, ASY'LUMS, n. plu. [L. *asy'lum*—from Gr. *as'ulon*—from Gr. *a*, not; *sulăō*, I rob or plunder: It. *asilo*: F. *asile*]: a place out of which he that has fled to it may not be taken or robbed; a place of refuge; a sanctuary; a hospital for the insane.—SYN.: a refuge; sanctuary; shelter; retreat. In ancient times, sacred places, especially the temples and altars of the gods, were appointed as asylums to which criminals, as well as persecuted persons, might flee for refuge; and to molest them in such places

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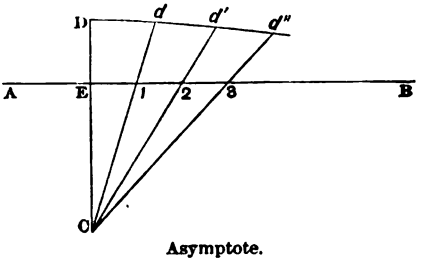
was regarded as an impiety. An analogous institution is found in the laws of the Jews, Num. xxxv., where six 'cities of refuge' are appointed for persons guilty of manslaughter. Among the Greeks in early times. these asylums may have been sometimes useful in preventing hasty retribution; but in the course of time they were so much abused that their sanctity was in a great measure disregarded. Thus Pausanias, who fled to the altar of Minerva, was taken and slain there by the Lacedæmonians, and in other cases the refugee was compelled to leave the A. by fire or starvation. In Rome, the emperor Tiberius abolished all such places of refuge from law. excepting those in the temples of Juno and Æsculapius. The custom of allowing to real or supposed criminals a place of safety in temples, was adopted also by the ancient Christian Church. In the time of Constantine the Great, the churches were made asylums; and Theodosius II. extended the privilege to all courts, alleys, gardens, and houses belonging to the church. In 681, the synod of Toledo extended the privilege of A. to a space of 30 paces around every church. In the lawless periods of the middle ages, the influence of the church often prevented deeds of gross injustice and violence; but the sanctity of churches was abused by criminals; and this led to several modifications which gradually destroyed the privilege of Sanctuary (q.v.). In England, it was abolished by acts passed 1534 and 1697. The word A. is now applied to places of shelter for unfortunate or destitute persons, and especially to hospitals for the blind, the deaf and dumb, and especially for the insane. See LUNACY.

ASYMMETRY, n. *a-sĭm'mĕt-rĭ* [Gr. *asummetria*—from *asummetros*, incommensurable, unsymmetric; or from *a*, without; *summetria*, symmetry; *summetros*, commensurate with—from *sun*, together; *metron*, a measure]: want of symmetry; want of proportion. ASYM'METRAL, or AS'YMMETRICAL, a. not agreeing, inharmonious.

ASYMPTOTE, n. *ăs'ĭm-tōt* [Gr. *asŭmptōtus*, not falling together—from *a*, not; *sun*, together; *ptōtos*, apt to fall]: a line that approaches nearer and nearer to some curve with-



Asymptote.

out ever meeting it: ADJ. approaching but never meeting. An example of an A. will be seen under HYPERBOLA. As another illustration, let AB be a straight line which can be produced to any length towards B. Take any point, C,

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without the line, and draw a perpendicular reaching to any distance, D, beyond the line; set off any equal distances, E—1, 1—2, 2—3, etc., along AB; and draw C1*d*, C2*d'*, C3*d''*, etc, making 1*d*, 2*d'*, 3*d''* etc., equal to ED. Now, it is evident that each of the points *d*, *d'*, etc., is nearer to the line AB than the one to the left of it; if, therefore, a curve is traced through these points (the curve is called the *conchoid*), it must continually approach the line AB. On the other hand, it is evident that the curve can never meet AB; for a line drawn from C to any point in AB, however distant that point, must, when produced, cross AB. AB is thus an *A.* to the curve. To the senses, indeed, the curve and line soon become one, because all physical or sensible lines have breadth. It is only with regard to *mathematical* lines (see LINE) that the proposition is true; and the truth of it has to be conceived by an effort of pure reason, for it cannot be represented. ASYMPTOTIC, a. *ăs-ĭm-tŏt'ĭk*, or ASYMPTOT'ICAL, a. [Eng. *asymptote:* F. *asymptotique*]: pertaining or relating to the asymptotes of a hyperbola; perpetually approaching anything, but never meeting it.

ASYNARTETE, a. *ă-sĭn-ăr'tēt* [Gr. *asunartetos*, not united, inconsistent—from *a*, without; *sunartao*, to hang up with, to knit or join together—from *sun*, together; *artaō*, to fasten to]: not fitted or adjusted, disconnected. ASYNARTETE SENTENCE, in *gram.*, a sentence of which the members are not united by connective particles. ASYNARTETE VERSE, in *pros.*, a verse consisting of two members, having different rhythms; as when the first consists of iambuses and the second of trochees, or the first of dactyls and the second of iambuses.

ASYNDETON, n. *ă-sĭn'dĕ-tŏn* [Gr. *a*, not; *sundĕtos*, bound together]: a figure in *rhet.*, which keeps the parts of speech together without the use of conjunctions—as, 'heal the sick, cleanse the leper, raise the dead, cast out devils'—where the connecting word 'and' is omitted.

AT, prep. *ăt* [AS. *aet:* Icel. *at:* Dan. *ad:* Skr. *adhi*, upon: L. *ad*, to]: near to; beside; in or near; with; towards. AT LAST, denoting the end has been reached after interruptions, disappointments, etc. AT LENGTH, denoting the goal or end has been reached after a long period or interval of time—this phrase and preceding often used synonymously.

ATACAMITE, n. *a-tăk'-a-mīt:* a native ore of copper, called also copper-sand; abundant in some parts of S. America, as in the desert of *Atac'ama* between Chili and Peru, from which it derives its name; at Remolinos, Santa Rosa, and other districts in Chili, and at Sarapaca in Bolivia, where it is associated in veins with ores of silver; found also as a crust in the lavas of Vesuvius and Etna, especially on those of Vesuvius erupted in the years 97, 1804, 1820, and 1822. The natural varieties of A. are crystallized, massive, and pulverulent or granular. The massive or compact variety is usually reniform, with a fibrous structure. The crystals are short and needle-shaped; the primary form is a rhombic prism. It has

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been sometimes incorrectly described as a chloride of copper; and sometimes as a hydrochlorate (muriate) of copper; it is to be regarded rather as a hydrated cupric oxychloride, $CuCl_2,3CuH_2O_2$. It is a rich and productive ore, containing about 55 or 60 per cent. of copper. The percentage composition of various specimens of A. is as follows:

	Copper Protoxide	Muriatic Acid.	Water.	Total.
Compact atacamite.....	72·0	16·3	11·7	100
"	76·5	11·0	12·5	100
Sandy atacamite.....	70·5	11·5	18·0	100
Crystallized atacamite...	73·0	16·2	10·8	100

A. forms often on the surface of copper exposed to the air or sea-water; and the greenish incrustation observed on antique bronze utensils, weapons, and other articles, and commonly known as the *ærugo nobilis*, is composed of this salt. On some antique bronzes from Egypt the A. is crystalline. A. is worked in South America as an ore of copper; and considerable quantities are sent to England to have the metal extracted therefrom. See COPPER.

ATAGAS, n. *ăt'a-găs:* a gallinaceous bird, the red cock.

ATAGHAN, n. *ăt'a-găn,* or YAT'AGHAN [Fr. *yataghan* —from Turk. *yatagân*]: a long dagger worn with pistols in the belt, in a metal scabbard, generally of silver, and among the wealthier gilt, or of gold.

ATAHUALPA, *â-tâ-hwâl'pâ:* d. 1533: favorite son of Huayna Capac, Inca of Peru (d. 1525). The father's death was about seven years before Pizarro's arrival in Peru. The mother of A. not being of the pure Inca blood, her son was formally excluded from inheriting the throne; but his handsome figure, bold spirit, and quick intelligence so won upon the affections of his father, that on his death-bed he declared it to be his will that A. should receive as his portion the ancient kingdom of Quito (recently conquered), while Huascar, his eldest son, should possess Peru. For five years the brothers lived on terms of real or apparent friendship; but at length the restless ambition of A., who was constantly aspiring to new conquests, excited the uneasiness of Huascar, who, in an evil hour, was induced to send an envoy to his brother, with instructions to require him to render homage for his kingdom of Quito. A. fired at the proposal, and war was instantly declared. Placing himself at the head of the army of veterans which his father had left him, he invaded Peru, and in the spring of 1532 completely defeated Huascar on the plains of Quipaypan, in the neighborhood of Cuzco, the native Peruvian metropolis, only a few months before the arrival of the Spaniards. Huascar was taken prisoner and confined in the strong fortress of Xauxa. Then followed, according to Garcilasso de la Vega, a series of atrocious massacres of all in whose veins ran the blood of the Incas; but his statements are so monstrous, and have so little congruity, that they are rejected by Prescott as intrinsically incredible. In the meantime, the Spaniards had disembarked at Tumbez; and after a long, brave, and perilous march through

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the unknown country, Pizarro, at the head of his two hundred cavaliers, approached the victorious camp of A., where he found some fifty thousand men assembled. By a daring but diabolical stratagem, Pizarro obtained possession of the person of the king, who had come to visit him in a friendly spirit. While a priest was explaining the Christian religion, and the power of the pope over all the kingdoms of the earth, and how the pope had presented Peru to the Spanish monarch, in whose name they had come, A., indignantly interrupting him, told him that the pope (whoever he was) must be a crazy fool to talk of giving away countries which were not his own. When he inquired on what authority such claims were made, the priest pointed to the Bible, on which A. dashed the book on the ground, and the fields began to fill with Indians. The moment was critical. The crime which Pizarro had resolved upon the night before must be executed then or never. He waved a white scarf, which was the signal agreed upon. The mysterious artillery poured sudden death into the terrified masses of Peruvians, while the Spanish cavalry rode them down with merciless fury. Confusion seized the natives; they submitted—being unarmed—to this terrible butchery, only anxious to save their sacred Inca; but all their efforts to accomplish this proved unavailing, and after exhausting hours in the miserable work of murder, the inhuman Spaniards succeeded in capturing him. A. was treated with a great show of kindness at first, and more especially when he offered as a ransom, 'not merely to cover the floor, but to fill the room in which he stood with gold as high as he could reach.' When A.'s brother, Huascar, who was still a prisoner, heard of this, he offered still more advantageous terms for himself. To prevent this, A. had him secretly assassinated. The golden treasure which was to constitute the ransom of A. now began to pour in, and at length A. demanded his freedom. This Pizarro refused to grant, and accused A. of plotting against him. The result, after much base treachery on the part of the Spaniard, was a mock trial, in which A. was condemned to be burned; he was led to the stake, 1533, Aug. 29; but on agreeing to be 'baptized' his sentence was commuted to death by strangulation.

ATALANTA, *ăt-a-lăn'ta:* a mythical personage, daughter of Iasus and Clymene; b. in Arcadia; celebrated as a huntress, skilled in the use of the bow and arrow. Her father, who had wished a son, exposed her, while an infant, on Mount Parthenios, where she was found near the entrance of a cave by hunters, who brought her up, and afterwards restored her to her parents. While living as a wild mountain-maiden, she slew the centaurs Rhœcus and Hylæus. Afterwards she sailed with the Argonauts (q.v.) to Colchis, and was prominent in the chase of the Calydonian boar (q.v.). She had many suitors, but was merciless in the conditions which she imposed on them. Being the swiftest of mortals, she offered to become the wife of him that should outstrip her—the penalty of defeat being death. At length she was conquered by a trick of one Meilanion,

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whom she was compelled to marry. He obtained from Venus a gift of three golden apples, which he successively dropped in the race; and A. was so charmed by their beauty, that she could not refrain from stooping to gather them, and so lost.—Mention is made of another A. in Greek antiquity, to whom a different parentage is assigned, but regarding whom the myth is essentially the same.

ATALIK-GHAZEE, n. *ă-tăl'ĭk-gă'zē* [Hind. *atalik*, a private tutor, a preceptor: Arab, Hind. *ghazi*, a Mohammedan hero, especially if victorious in the battle against the 'infidel']: title given to the ruler of eastern Turkestan.

ATARAIPU, *â-tâ-rī-pō'* [signifying *Devil's Rock*]: a singular eminence in British Guiana, a granite pyramid, which rises abruptly from the plain abt. 900 ft., wooded for rather more than one-third of the height, but bare thence to the peaked summit.

ATAVISM, n, *ăt'a-vĭzm* [L. *atăvus*, an ancestor—from *avus*, a grandfather]: the reappearance of any peculiarity of a family in a generation, after a period of latency; in *zool.*, the tendency of species or varieties to revert to an original type. Darwin used the term *reversion to type* as almost a synonym for Atavism.

ATAXIC, a. *ă-tăk'sĭk*, or ATACTIC, a. *ă-tăk'tĭk* [Gr. *a*, without; *taxis*, order—from *tasso*, I put in order]: wanting order; irregular. ATAXIA, n. *ă-tăk'sĭ-a*, irregularity; want of co-ordination in the movements of a limb or organ.

ATBARA, or BAHR-EL-ASWAD: see NILE.

ATCHAFALAYA, *ăch-af-a-lī'a:* a branch of the Mississippi at its delta. It forms so large an angle with the main river, that, after a course of only 130 m., it enters the Gulf of Mexico, 120 m. to the w. of New Orleans. From the Red river, which enters the Mississippi just above its own point of departure, the A. had received so much driftwood, that some years since a stationary raft had been formed, 10 m. long, 220 yds. broad, and 18 ft. deep—an obstacle to navigation which the state of Louisiana required four years to remove.

ATCHEEN, *ăt-chēn':* till 1873 an independent kingdom forming the n.w. part of Sumatra; 6,370 sq. m. The interior is mountainous, Abong Abong attaining a height of 10,988 ft. The natives are well made, industrious, intelligent, but treacherous. In 1873, the Dutch declared war, and, though at first repulsed, by 1879 had wholly conquered the country. Pop. (1890) 290,700, of which 196 European. The people barter for opium with Penang and Singapore, pepper, edible nests, gold-dust, camphor, benzoin, sulphur, satin-wood, betel nuts, etc.

A., the cap., lies on both sides of the river, 5° 35′ n. lat., 95° 26′ e. long.; in a large valley formed by ranges of hills, of which the Golden Mountain is the highest. Pop. 36,000.

ATCHESON, n. *ăt'chĕ-son*, or ATCHISON, n. *ăt'chĭ-son* [named after Mr. Atkinson (or the Scotch pronunciation Atcheson), an Englishman who was assay-master of the

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mint at Edinburgh in the beginning of James VI.'s reign]: a copper coin, washed with silver, struck in the reign of James VI.: value, eight pennies Scotch, or ⅔ of an English penny.

ATCHEVE'MENT: term nearly equivalent to armorial bearings and often used of a funeral escutcheon. See HATCHMENT.

ATCHISON, *ăch'ĭ-sŭn:* city in Kansas, cap. of Atchison co., pleasantly situated on the right bank of the Missouri river at the extreme point of the 'Great Bend' of that stream. It is abt. 30 m. above Leavenworth, the e. terminus of the A. & N. railroad and of the Central Branch of the Union Pacific railroad, the w. terminus of the Missouri Pacific railroad, the n.w. terminus of a branch of the Chicago Rock Island & Pacific railroad, and the e. terminus of the Atchison Topeka & Santa Fé railroad. It is a very important railroad centre; on the eight roads which meet here ninety or more trains arrive and depart daily. It has large and varied industries, particularly in flour mills, machine shops, engine works, and furniture and carriage factories. Its commerce is extensive and rapidly growing. In 1892 it was the third city in the state in distribution of milling products and of general incoming products; had 8 m. of paved streets, 4 m. of sewers, electric light plant, new union depot, 3 national banks (cap. $250,000), 2 state banks (cap. $140,100), 1 trust co., 3 daily, 3 weekly, and 1 monthly periodicals, 6 public schools, 14 churches, several public halls, public library, city hospital, and the State Soldiers' Orphans' Home. Among its educational institutions were the Western College of the Gen. Synod of the English Evang. Luth. Church; St. Benedict's College; and the Atchison Institute, founded 1870. A fine iron bridge crosses the Missouri river, connecting the city with the railroad lines that terminate on its e. bank. In 1891 the assessed valuations were: real $2,355,110, personal $492,970, railroad $110,930. Pop. (1880) 15,105; (1890) 13,963.

ATE, v. *ăt* or *ĕt*, pt. of EAT, which see.

ATE, n. *ā'tē*, in *Gr. myth.:* according to Homer, the daughter of Jupiter—or of Eris, as Hesiod says—a vengeful goddess, ever attending *dysnomia*, or transgression of law, though she herself prompted men to transgress. She was banished from Olympus by Jove, whom she had incited to take an oath of which he subsequently repented. She then travelled swiftly to and fro over the earth, always intent on exercising a pernicious influence upon mankind. But her steps were followed by the goddesses *Litai* (prayers), benevolent daughters of Jove, who healed those who had been afflicted by A. The tragic writers describe A. as the goddess of retribution. Their representations almost identify her with NEMESIS and ERINNYS.

ATEAL, ATTEILLE, n. *a-tēl'*, or ATTILE, *-il* [*teal*]: Scotch name of a duck, the Widgeon (*anas penelope*), or an allied species.

ATELES, *ăt'ĕ-lēz* [Gr. incomplete]: genus of American monkeys, of the division with long prehensile tails, to

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which the name Sapajou (q.v.) is sometimes collectively applied. In the genus A., the head is round, and the facial angle about 60°; the limbs are remarkably long and slender, upon which account the English name Spider Monkey (q.v.) is sometimes used as a generic designation; and the forelimbs are either entirely destitute of a thumb, or have a mere rudimentary one, a peculiarity in allusion to which the name A. was given. The name Coaita or Quata is frequently given to some of the species of A., but is sometimes limited to *A. Paniscus*, as Spider Monkey sometimes is to *A. arachnoides*. One of the best-known species is the Marimonda (*A. Belzebub*), a common monkey of Guiana, immensely numerous on the banks of the Orinoco.

ATELESTITE, n. *ă-tĕl'ĕs-tīt* [Gr. *ateles*, incomplete]: so spelled in Dana's System, 1892—formerly ATELESITE, and then classed under Eulytine, a bismuth silicate: a rare yellow mineral, bismuth arsenate. ATELITE is a copper chloride, volcanic.

ATELIER, n. *ăt-ĕl-yā* [F.]: the workroom of a painter or sculptor—called also a 'studio.'

ATELIERS NATIONAUX, *ăt-ĕl-yā nă-sĭ-ŏ-nō*, or NATIONAL WORKSHOPS: establishments for governmental provision of work, and organizing of labor; notable in connection with the French revolution of 1848. Immediately after the downfall of Louis Philippe, and the formation of the provisional govt., 1848, Feb., a permanent dept. was established, called *The Committee of the Government for the Workmen*, acting on the doctrine that all workmen were entitled to a living provided for them on a certain uniform scale. While private employment was not forcibly abolished, inducements were held out which made workmen leave and employers break up the existing establishments. Consequently, nearly all the Parisian workmen threw themselves on the govt., and others flocked in, in alarming numbers —mostly with little idea of the duty of working, even were there distinct employment for them. One incidental experiment illustrates the condition. In the Hôtel Clichy, 1,500 tailors were assembled to make uniforms for the new *garde mobile*. The men were to receive among them for the completed work as much as an army-contractor would have demanded; meanwhile they were paid two francs a day for subsistence; the rest was to be divided among them at the end. The men, expecting to receive not only their proper wages, but also the enormous sum which they supposed to form the profit of the contractor, were wild with disappointment when they found nothing to divide. There was, in fact, a loss. Early in May the body of workmen dependent on the govt. had increased to 130,000; and when the govt. found it necessary to abolish the system, the discontent fermenting in Paris was kindled into the armed insurrection put down by the national forces under Cavaignac, only after the terrible fighting of the *Days of June*. Advocates of the principle of competition as against the theory of governmental organization of labor adduce the A. N. as a test showing the latter an utter failure. On the other side it is claimed that the times and

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the social conditions rendered a real test impossible—the govt. a mere expedient staggering through a few months of transition to despotism, and society itself a heaving sea. See COMMUNISM: SOCIALISM: BLANC, LOUIS.

ATELLANÆ, *a-tĕl-lā'nē*, *Fabulæ Atellanæ* (also styled *Ludi Osci*): a kind of popular drama in Rome, introduced from Atella, a town in Campania, between Capua and Naples. After the Greek drama had been brought to Rome by Livius Andronicus, the old *Fabulæ Atellanæ* were still retained as interludes and after-pieces. They are not to be confounded with the Greek satiric drama, although their character was to some extent the same. In the latter, satyrs figured; while the former personated real Oscan characters. The *Maccus* and *Bucco* of the *Fabulæ Atellanæ* may be considered the origin of the modern Italian *arlecchino* (harlequin), and other characters of the same stamp. They were the favorite characters; spoke the Oscan dialect, and excited laughter by its quaint old-fashioned words and phrases. The A. were neither so dignified as the *comœdia prætextata*, nor so low as the *comœdia tabernaria*, but indulged in a kind of genial and decent drollery. The caricature was at first always pleasant, and though quizzical, it did not lapse into obscenity, like the *mimi*. Respectable Roman youths, who could not appear as actors in the regular Greek drama without losing *caste*, were allowed to take parts in the A. A few fragments of these popular farces have been collected by Bothe in his *Poetarum Latinorum Scenicorum Fragmenta* (Leip. 1834). See also Munk, *De Fabulis Atellanis* (Leip. 1840).

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A TEMPO, ad. *ă-těm'pō* [It. in time]: in *music*, used to indicate that the interrupted time is to be restored.

A TEMPO GIUSTO, *â těm'pō jōs'tō* [It., in correct time]: in *mus.*, used to denote that, after a recitative, the performer should keep the music true and correct, which, during the recitative, had been altered to suit the action and passion of the scene.

ATER, *ā'tĕr* [L. *ater*, black]: pure black; as a prefix, spelt *atro*.

ATESHGA, *ā'tĕsh-gâ'* [the Place of Fire]: a spot on the peninsula of Apsheron, on the w. coast of the Caspian Sea. It is considered sacred by the Guebres, or Persian Fire-worshippers, who visit it in large numbers, and bow before the holy flames which issue from the bituminous soil. It is about a mile in diameter, and from its centre, in clear dry weather, creeps forth a blue flame (caused by the ignition of the naphtha), which shines with great brightness by night.

ATESSA, *â-tĕs'sâ:* town of s. Italy, province of Chieti; 23 m. s.s.e. from Chieti. It has a beautiful collegiate church, and several other churches and convents. Pop. 5,200.

ATEU'CHUS: see BEETLE: SCARABÆUS.

ATH, or AATH, *ât:* strongly fortified town in the province of Hainault, Belgium; on the Dender; lat. 50° 36′ n., long. 3° 46′ e. It has an arsenal, hospital, and college, and important manufactures of linen, calicoes, lace, gloves, cutlery, large hammers, etc., and carries on a brisk trade. The ancient church of St. Julien in A. is noted for its extraordinarily high tower. The town has been several times besieged and taken; in 1697, by Catinat and Vauban; in 1706, by the allied forces under the Dutch general Owerkerke; in 1745, by the French after a short siege; and in 1792, by the forces of the Republic under Berneron. Pop. about 10,000.

ATHABASCA, *ăth'a-băs'ka:* river and lake in the n.w. of N. America, forming part of the great basin of the Mackenzie; therefore, in the Northwest Territory of the Canadian Dominion. The *river* rises in the Rocky Mts. near Mount Brown, the highest point in the range. Its actual source is the small lake (see under AMERICA), known as the Committee's Punch Bowl, which sends its tribute at once through the A. to the Frozen Ocean, and through the Columbia to the Pacific. Its general course is n.e., till, after passing through A. Lake, or rather crossing its w. end, it turns towards the n.w., and, after a course of 30 or 40 m., unites with the Peace river, from beyond the Rocky Mts., to form the Slave river, which, again, after passing through Great Slave Lake, takes the name of the Mackenzie.—*Lake* A. receives nearly all its waters from the A. river, and is noticeable for the fact that its principal feeder traverses not its length but its breadth, and that not in its middle, but at its extremity. The lake's single outlet is the river A.

ATHABAS'CA: a new division of the Canadian north-

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west, between British Columbia and the A. river; formed 1882; 122,000 sq. m. It contains the fertile Peace river districts.

ATHA-BEN-HAKEM: see MOHAMMEDAN SECTS.

ATHALIA, n. *a-thā'li-a* [Gr. *athales*, not verdant, withered]: genus of saw-flies, *tenthredinidæ*. *A. spinarum* or *centifoliæ* is the Turnip Saw-fly, so called because its larvæ, which are the animals called *blacks* or *niggers*, feed on turnips. The perfect insect is common in some years from May to August. It has a black head, a red thorax, with two large and several smaller spots on the back, and an orange-colored abdomen.

ATHALI'AH: daughter of Ahab, King of Israel, married Jehoram, King of Judah, who died B.C. 885. After the death of her son Ahaziah, who succeeded him, but reigned for only one year, she paved her own way to the throne by putting to death (as she supposed) all the seed-royal. 'But Jehosheba, the daughter of king Jehoram, sister of Ahaziah, took Joash, the son of Ahaziah, and stole him from among the king's sons, who were slain.' The young prince thus rescued was privately educated in the temple, and, after A. had reigned six years, the high-priest Jehoiada placed Joash on the throne (B.C. 878). A., hearing the noise attending the coronation, hastened to the temple, where the people were shouting, 'God save the king!' As she looked round in astonishment on the young king, whom she had supposed to be dead, surrounded by priests, Levites, rulers, captains, and a rejoicing multitude, she 'rent her clothes, and cried, "Treason! treason!"' By the command of the high-priest, she was led out of the temple, and slain in the gateway of the palace. The house of Baal, with its altars and images, was broken down. This narrative (2 Kings xi.; 2 Chron. xxi. 6; xxii. 10–12; xxiii.) is the subject of Racine's drama, *Athalie*.

ATHANARIC, *a-thăn'a-rik:* King of the Western Goths (d. 381), whose settlements lay on the n. bank of the lower Danube. Because he had taken advantage of the weakness of the Roman empire when the imperial armies were engaged in suppressing the rebellion of Procopius, war was declared against him by the emperor Valens. A. acted strictly on the defensive during two campaigns, in which the Romans gained no advantage over him; but in the third year of the war (369), he hazarded a general battle, and was defeated, whereupon he sued for peace, and with that object had a conference with Valens in a boat on the Danube. Peace was concluded, and A. had his attention occupied in settling dissensions arising out of the Arian controversy which then agitated his people, when the first advance of the Huns on Europe alarmed the Gothic nation. A. attempted to secure the eastern borders of his kingdom; but the Huns forced the passages of the Dnieper, defeated the Goths, and advanced in great force into the plains of Dacia. When, in 374, the Western Goths were received by the Romans as allies, and had settlements granted them on the s. of the Danube, A., with a part of his people, refused to accom-

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pany them, removing to the w., and fortifying himself against the new enemy. In 380, however, he was obliged to retire, when he accepted the hospitality of the empire, and removed to Constantinople, where he was cordially and honorably received by the emperor Theodosius. At this time died Fritigern, King of the Goths, that had settled on the s. of the Danube; and A. being made king of the whole western Gothic nation, concluded a treaty of peace, in behalf of the whole, which had the effect of incorporating that people with the other subjects of the empire. He died at Constantinople.

ATHANASIAN, a. *ăth'a-nā'zhăn:* pertaining to Athanasius, a bishop of Alexandria in the fourth century, or to the creed called by his name. ATHANA'SIAN CREED: third of the three ecumenical symbols, named from its composition being attributed to Athanasius; it is also known, from its initial words in Latin, as the creed *Quicunque Vult.* The first part of this creed contains a detailed exposition of the Trinity; the second, the doctrine of the incarnation. Modern criticism has called in question the title of Athanasius to be considered the author of this creed. It was known as early as the beginning of the 6th c., but not under its present name. It is spoken of as 'Athanasius's Tract on the Trinity,' in some Articles of the middle of the 8th c., and is supposed to be alluded to, 'as the Faith of the holy prelate Athanasius,' in the council of Autun, about 670. Athanasius himself makes no mention of this creed, although its doctrines are essentially his; nor do any of the church fathers. Other two circumstances speak against its authenticity: it is in Latin, and Athanasius wrote in Greek; the expressions, again, are different from those used by Athanasius in speaking of the same things. By Protestants, therefore, and even by most Rom. Catholics, its Athanasian origin has been given up, and its production has been assigned with probability to the 5th c., and to Gaul; Hilary, Abp. of Arles (abt. 430), being conjectured to be the author. The title of Athanasian probably became attached to it during the Arian controversy in Gaul, as being an exposition of the system of doctrine which was opposed to the Arian system, and which would naturally be called Athanasian from its chief propounder. It was received into the public offices of the Gallic Church in the 7th c., and by the middle of the 10th c. it was adopted at Rome and all over the West. In Britain, it was probably in use as as early as 800. The Greek Church was late in receiving it, and even then not without altering the article concerning the 'Procession of the Holy Ghost.' The Reformers adhered to the Athanasian Creed, and Luther called it 'a bulwark of the Apostles' Creed.'

The Athanasian Creed is the most rigid and intolerant of the three Catholic symbols, and has given rise to much controversy; and though it is still generally received by many Protestants as well as by Rom. Catholics, the regard once had for it has declined. The points in this creed that give offense to some are defended by others, on the plea that it was drawn up not for the sake of gratuitously dogmatizing on abstruse speculative truths, but to counteract other dog

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mas held to be dangerously heretical. Waterland, in his *Critical History of the Athanasian Creed*, says: 'The use of it will hardly be thought superfluous so long as there are any Arians, Photinians, Sabellians, Macedonians, Apollinarians, Nestorians, or Eutychians, in these parts.' (See these titles.) With respect to what are called the 'damnatory clauses' (the clauses, namely: 'Which Faith except every one do keep whole and undefiled, without doubt he shall perish everlastingly;' and, 'This is the Catholic faith, which except a man believe faithfully, he cannot be saved'), the churches which adopt the creed do not mean by them to imprecate curses, but to declare, as a logical sequence of a true faith being necessary to salvation, that those who do not hold the true faith are in danger of perishing; as it is said, Mark xvi. 16, 'He that disbelieveth shall be condemned.' These clauses are also held to apply to those who deny the substance of the Christian religion, and not infallibly to every person who may be in error as to any one particular article. A rubric to this effect was drawn up by the commissioners appointed in 1689 for the review of the English Common Prayer Book, but none of their suggestions took effect. Compare also the 18th Article of the Church of England with these clauses. It is probably the growing opinion in Britain that this creed may well be spared from the authoritative utterances of the church. It was rejected (1786) from the Book of Common Prayer as adopted by the Prot. Epis. Church in the United States.

ATHANASIUS, *ăth-a-nā'shĭ-ŭs*, Primate of Egypt: 296–373; b. Alexandria: there is no record of his lineage or his parents. Alexander, then officiating as primate or patriarch of Alexandria, brought him up in his own family, and superintended his education, with the view of his entering the Christian ministry. In his youth, he often visited the celebrated hermit St. Antony, and embraced for a time the ascetic life with the venerable recluse. He was but a youth and only a deacon when appointed a member of the first general council at Nice, in which he distinguished himself by his erudition and his eloquence.

His patron, Alexander, having died in the following year, he was duly elected to the primacy by the clergy and people; and was but newly installed in his office, when Arius, who had been banished at the time of the condemnation of his doctrine at Nice, was recalled, and made a recantation of his erroneous principles. A., it is said, refused on this occasion to comply with the will of the emperor that the heretic should be restored to communion. On this account, and in consequence of several other charges brought against him by the Arian party, he was summoned by the emperor Constantine to appear before the synod of Tyre, 335, which deposed him from his office. His sentence was confirmed by the synod of Jerusalem in the following year, when he was banished to Treves. In 338, Constantius, now emperor of the East, though unfriendly to the principles of the Trinitarians, recalled A. from his banishment, and restored him to the primacy at Alexandria. His entrance into the city was like a triumphal procession; but the Arians soon rose

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against him, and (in 341) he was again condemned by a council of 90 Arian bishops assembled at Antioch. Against this decision a protest was made by 100 orthodox bishops at Alexandria; and in a council held at Sardis, 300 bishops, with Julius, Bishop of Rome, at their head, confirmed the decision in favor of A., who was again replaced in his office (349). The Arians once more acquired the ascendancy after Constantius (in 353) had been made emperor of both the East and the West; for in that year A. was condemned by a council held at Arles, and the sentence was confirmed by another held at Milan in 355, the influence of the sovereign being strongly exerted to secure his condemnation. As the resolute patriarch had declared that he would not leave his place without an express order from the emperor, violent means were resorted to for his expulsion. While engaged in conducting divine service, he was interrupted by a company of soldiers, from whom he made his escape into the Egyptian desert. A price was set on his head; and to avoid his persecutors he retired from the usual haunts of the anchorets to a remote desert in upper Egypt, where he was attended by one faithful follower. Here he wrote several works to confirm orthodox Christians in their faith. On the accession of Julian to the imperial throne, toleration was proclaimed to all religions, and A. returned to his former position as Patriarch of Alexandria (361). His next controversy was with the heathen subjects of Julian, to whom the patriarch, by his zeal in opposing their religion, had made himself very offensive. To save his life, he was compelled again to flee from Alexandria, and remained concealed in the Theban desert until 363, when Jovian ascended the throne. After holding office again as patriarch for only a short space of time, he was expelled anew by the Arians, under the emperor Valens. A. now found refuge in the tomb of his father, where he remained hidden four months, until Valens, moved by petitions from the orthodox Alexandrians, restored the patriarch to his see; in which he continued till his death.

A. was the leading ecclesiastic in a most trying period of the early church. His ability, his conscientiousness, his persistency, his fearlessness in the storms of opposition, his activity and patience, all mark him as an extraordinary man. Though twenty years of his life were spent either in exile, or its equivalent, yet his steadfastness, combined with the support of a large party, gave him finally the victory. He was a clear thinker; and as a speaker, was distinguished for extemporaneous precision, force, and persuasiveness.

His writings are polemical, historical, and moral; all marked by a style simple, cogent, and clear. The polemical works treat chiefly of the doctrines of the Trinity, the incarnation of the Son of God, and the divinity of the Holy Spirit.

The earliest edition of the collected works of A. in the original Greek appeared in two vols., folio, Heidelberg, 1600. Better is the great edition by Montfaucon (1698); and the recent standard edition in the library of the Fathers

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by the Abbé Migne (1860). A.'s Four Orations against the Arians, and his Oration against the Gentiles, were translated by Parker (1713); his Treatise on the Incarnation of the Word, by Whiston (1713; another ed., 1880). The Epistles of A. in defense of the Nicene Creed, and on the Councils of Ariminum and Seleucia, together with his first Oration against the Arians, were translated, with notes, by Cardinal Newman (1842). See the church histories by Neander and others; and works on A. by Möhler (2d ed. 1844), and Böhringer (2d ed. 1874).

ATHANOR, n. *ăth'a-nawr* [Ger. *athenor*—from Arab. *at-tannûr:* Heb. *tannûr*, a furnace]: a digesting furance formerly in use among chemists; designed to maintain a regulated amount of heat.

ATHARVANA, n. *a-thâr'va na* [Skr.]: the fourth and last of the Indian Vedas. Its language is more modern than that of the other three: see under VEDA (*Atharvaveda*).

ATHEISM, n. *ā'thē-ĭzm* [Gr. *athĕŏs*, denying the gods—from *a*, without; *thĕŏs*, a god: F. *athéisme*, atheism]: the disbelief in the existence of God. ATHEIST, n. *ā'thē-ĭst*, one who does not believe in the existence of God; an infidel, an unbeliever. ATHEISTIC, a. *ā'thē-ĭs'tĭk*, pertaining to; or A'THEIS'TICAL, a. *-ĭs'tĭ-kăl*. A'THEIS'TICALLY, ad. *-kăl-ĭ*. A'THEIS'TICALNESS, n. the quality of being atheistical. ATHEIZE, v. *ā'thē-ĭz*, to render atheistic; to speak or write in an atheistic manner. ATHEIZER, n. *ā'thē-ĭ-zĕr*, one who atheizes; one who teaches or encourages atheism. ATHEOUS, a. *ā'thē-ŭs*, in *OE.*, atheistic; godless.

A'THEISM: the doctrine of those who deny the existence of God. The term atheist, which conveys terrible associations to many minds, has been so freely applied by the zealous of all ages to those whose notions of the invisible powers differed from their own, that it has lost something of its former force. A little ingenuity serves to make out a case of *constructive* A. from any set of opinions at all differing from the common. Thus, the ancient Greeks accused some of their philosophers of A. though they did not deny the existence of a divinity, but only rejected the common notions of a plurality of gods. And in the Christian Church, after the doctrine of the Trinity had been fixed and defined, those that denied the divinity of Christ were not unusually branded as atheists.

The general revulsion from this name is shown in its earnest repudiation by the adherents of pantheism (q.v.), who reject a personal God, and substitute the idealized principle of order that pervades the universe. It is hardly to be denied, however, that the idea associated with the word God has hitherto involved personality as its very essence; and except for the purpose of avoiding odium, there could be little propriety in retaining the word when the notion is so completely altered.

The view of those who, like Kant, believe it impossible to *demonstrate* satisfactorily the existence of God, though the divine existence must be held on other grounds, is called *speculative* A., in opposition to the *dogmatic* A. of those who attempt to disprove that existence.

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ATHELING, n. *ăth'ĕl-ĭng* [AS. *athel*, noble; *ing*, son of]: in *OE.*, one of noble or royal descent; the royal heir-apparent.

ATH'ELNEY, Isle of: a marsh at the junction of the rivers Tone and Parret, in the middle of Somersetshire. Here Alfred, when driven from his throne, hid from his enemies, and founded, in 888, a Benedictine abbey, now entirely gone. Among the many relics found in this spot is a ring of Alfred's, preserved in the Oxford Museum. The name Athelney means 'island of the nobles,' or 'royal island.'

ATHELSTAN, *ĕth'ĕl-stăn*, Saxon monarch who first took the title King of England: abt. 895–941, Oct. 25; grandson of Alfred the Great. Alfred had assumed the title only of King of the Anglo-Saxons. Athelstan was crowned at Kingston-upon-Thames, 925, and seems to have had ambition and talent. It is supposed that his design was to unite in subjection to his single sway the entire island of Britain. His resources, however, were not equal to the undertaking, and he had to content himself with the acquisition of portions of Cornwall and Wales. On the death of Sigtric, King of Northumbria, who had married one of his daughters, A. took possession of his dominions. This excited the alarm and animosity of the neighboring states, and a league, composed of Welsh, Scotch, and Irish, was formed against the English king, for the purpose of placing Aulaff, the son of Sigtric, on his father's throne. A fierce and decisive battle was fought at Brunenburgh, in which the allies were utterly defeated, and which became famous in Saxon song. After this, the reputation of A. spread to the continent. His sisters were married into the royal families of France and Germany, and he had great influence and consideration. At home, he showed deep interest in the welfare of his people, improved the laws, built monasteries, and encouraged the translation of the Bible into the vernacular. He died at Gloucester.

ATHENÆUS, *ăth-a-nē'ŭs:* a Greek *rhetor* and *littérateur*, at the close of the 2d and beginning of the 3d c.; b. Naucratis, Egypt. His work, entitled *Deipnosophistæ* (Banquet of the Learned) in fifteen books, but of which remain only the first two, and parts of the third, eleventh, and fifteenth in an abridged form, is very interesting, as it preserves copious fragments of old writers, and treats, in the form of dialogue, of almost all the topics of ancient Greek manners, private and public life, arts, sciences, etc. The work is not indicative of genius or of high ability; the author, for the most part, appears in the character of an agreeable, well-read, epicurean gentleman, excessively fond of *tid-bits*, both of scandal and cookery. He tells many stories to the disadvantage of people whom history praises; but these we are by no means bound to believe, nor, indeed, is he a man whose opinions are worth much on any subject, but as a melange of literary, social, and domestic gossip, the value of the work is unrivalled. A. appears to have read enormously; he states that he had made extracts from 800 plays of the middle comedy alone;

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but his dialogue is prolix and lumbering. The best editions are by Schweighäuser (14 vols. 1807), Dindorf (3 vols. 1827), Meineke (4 vols. 1867). There is an English translation of A. (3 vols. in Bohn's series, 1854).

ATHENAGORAS, *ăth-ē-năg'ō-ras:* Christian philosopher in the 2d c., who taught first at Athens, afterwards at Alexandria. He is one of the oldest of the apologetical writers, and is favorably known by his *Legatio pro Christianis,* which he addressed to the emperor Marcus Aurelius, 177. He therein defended the Christians against the monstrous accusations of the heathen, viz., that they were guilty of atheism, incest, and cannibalism. His work is written in a philosophical spirit, and is marked by great clearness and cogency of style. There remains also a valuable treatise of A. on the resurrection of the dead.

ATHENAIS *ăth-ē-nā'-ĭs:* b. Athens abt. the end of the 4th c.; d. 460; dau. of Leontinos the Sophist. She received from her father a superior education, being skilled in Greek and Latin literature, rhetoric, astronomy, geometry and the science of arithmetic. After his death she went to Constantinople, to obtain justice for the harsh treatment to which her brother subjected her. Here her beauty and intelligence made her the favorite of Augusta Pulcheria, sister of Theodosius II., who considered that she would make an excellent wife for the emperor. In 421, A., having been baptized and named Eudocia, was married to Theodosius, and in 438, made a splendid pilgrimage to Jerusalem, bringing with her, on her return, the supposed relics of the first martyr, Stephen. Aftewards, she lost the favor of Pulcheria—the real manager of affairs—and was banished from the court, retiring to Jerusalem, where she suffered many persecutions, and died, in the odor of sanctity. A. wrote an epic poem on the war of Theodosius against the Persians, and several other metrical works, which have not been preserved.

ATHENE, or ATHENA: see MINERVA.

ATHENEUM, or ATHENÆUM, n. *ăth'ĕ-nē'ŭm* [Gr. *Athenaion,* the temple of Minerva at Athens; *Athēnē,* the goddess Minerva]: a public reading or lecture room. The A. at Athens was frequented by poets, learned men, and rhetoricians, who there read aloud their works.—The A. in Rome was a school or college erected, by the emperor Hadrian, for the study of poetry and rhetoric, with a regular staff of professors. It existed for a long period. In the time of Theodosius II., it had three professors of oratory, ten of grammar, five of sophistry or dialectics, one of philosophy, and two of jurisprudence.—In modern times, the name A. has been revived as an appellation for certain literary institutions, and also as a collective title for literary essays and reviews. A. is the title of two weekly journals of literature, science, and art—one published in London, the other in Paris.

ATHENIAN, a. *ă-thē'nĭ-an:* of Athens: N. an inhabitant of Athens.

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ATHENS, *ăth'ĕnz:* cap. of the ancient state of Attica; said to have been founded by Cecrops, about B.C. 1500, and styled Cecropia; but even the ancients themselves doubted this tradition. Equally uncertain is the story that it was first styled A., in honor of Athene, during the reign of Erichthonius. The ancient citadel was situated on a square craggy rock, 513 ft. high, with a flat summit 1,000 ft. long, and 500 broad. Gradually, as population increased, A. extended over the wide and beautiful plain below. This increase is said to have been due to the organization of the twelve Attic tribes into a political confederacy or union by Theseus, the brightest figure in the 'dark ages' of Attic history. The position of A. near the Gulf of Saronica, opposite the eastern coast of the Peloponnesus, was favorable to the acquirement of naval power. The city, four or five miles from the sea, had three harbors, all situated on the s.w. side, and connected with it by walls. The oldest of these harbors was Phalerum, the nearest to the city, and accessible at all times by a dry road. The Piræus was used as a harbor first by Themistocles. Munychia was the Acropolis of the whole rocky peninsula termed the Piræus, and of immense importance strategetically. The last two harbors were connected with the city by the famous 'long walls,' of which we read so much in Athenian history. They were forty stadia, or nearly five m. in length. Two streams flowed in the vicinity of A.; on the e. side, the Ilissus, which also washed the s. part of the city; and on the w., the Cephisus, about a mile and a half beyond the walls. To the w. lay Salamis, with Eleusis on the n.w., Phylæ and Decelea on the n., Marathon on the n.e., and Hymettus on the s. All along the coast were splendid buildings.

The whole of the magnificent prospect was crowned by the Acropolis, where all the most glorious monuments of A. were assembled. First rose the Parthenon (q.v.), or Temple of Minerva, a pile which even now, after the lapse of centuries, remains among the wonders of the world. The Propylæa, all built of white marble, formed the entrance to the Parthenon, Close to it, on the n. side of the Acropolis, rose the Erechtheium, the most venerated of all Athenian sanctuaries, and connected with the oldest religious history of the city. The whole of it was destroyed by the Persians, but was restored during the Peloponnesian war. Its ruins still exist, and give a correct idea of the external form and structure. In some points it differed from all other Greek temples. It is sufficient to say, of the many magnificent buildings which were the glory of ancient Athens, that gods were never more superbly honored in any land. The enthusiastic love of the beautiful which animated the Athenians, turning their religion into an art, and making worship an education in æsthetics, is nowhere so clearly visible as in their religious architecture. Their mythological faith stood daily before their eyes in monumental splendor, for almost every deity had his temple or shrine in the city. Two of the finest buildings—the Temple of Theseus, and that of Jupiter Olym-

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pus—were on the outside of the city; the first to the N.W., and the second to the S. The former, built about B.C. 465, therefore older than the Parthenon, was both a temple and a tomb, inasmuch as it held the remains of Theseus himself. It had the privilege of an asylum for slaves, and the large space of ground which it inclosed was frequently used as a muster-ground for the Athenian soldiery. It was built of the favorite Pentelic marble, in the Doric style of architecture, and is the best preserved of all the monuments of ancient Athens. For centuries it was a Christian church, appropriately dedicated to St. George, the chivalrous hero of the 'dark ages' of Christianity, as Theseus had been of the 'dark ages' of the Attic history; but is now the national museum of the city. The Temple of Jupiter, of which fifteen grand Corinthian columns are still extant, to the S.E. of the Acropolis, and near the the right bank of the Ilissus, in size, splendor, and beauty excelled all other Athenian structures. Immense sums of money were expended upon it from the time when it was commenced by Peisistratus, until it was completed by Hadrian, a period of 700 years. The building of it was frequently suspended, so that Philostratus calls it 'a struggle with time.' At the time the Persians sacked the city, it was fortunately only beginning to be built, and so escaped destruction. Aristotle speaks of it as a work of despotic grandeur, and equal to the Pyramids of Egypt. The exterior was decorated by about 120 fluted columns, 61 ft. in height, and more than 6 ft. in diameter. It was 354 ft. long, and 171 broad, and contained the celebrated statue of the Olympian Jupiter in ivory and gold, the work of Phidias.

Besides these wonders of art, the city contained places of interest of which the memory will perpetually remain—the Academy where Plato, whose estate lay near it, gave his lessons in a grove of plane-trees adorned with statues; tradition alleged it to have belonged originally to Academus. Hipparchus surrounded it with a wall, and Cimon adorned it with walks, fountains, and olive-groves. The Lyceum, most important of the Athenian gymnasia, where Aristotle lectured; and, near to this, the Cynosarges, where Antisthenes the Cynic expounded his 'harsh and crabbed' doctrine; the hill of the Areopagus, where the most venerable court of judicature was held; and the Prytaneum, or senate-house. About a quarter of a mile to the W. of the Acropolis is a low hill, which marks the locality of the Pnyx, a place of public asssembly, forming a large semicircular area, bounded at the base by a limestone wall, from which projects a pedestal, carved out of the rock, and ascended by steps. This most interesting place has been preserved almost in its integrity, and, as we look around, we are carried back to the times when some six thousand Athenian citizens were here assembled, when the orator, standing upon the pedestal, could survey the Acropolis, with all its temples, the venerable Areopagus, and beyond the city, the extended plains and villages of Attica, with corn-fields, olive grounds, and vineyards.

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A., in its most flourishing period, numbered 21,000 free citizens; from which we may calculate that it contained about 200,000 inhabitants. More than two thousand years have passed over the beautiful city, and still its remains excite the admiration of the world. The Turks surrounded it with wide irregular walls, partly built out of the ruins of the old walls, and containing many fragments of noble columns. Of the Propylæa, the right wing, or Temple of Victory, was destroyed in 1656 by the explosion of a powder-magazine. Six columns, with lofty arches, remain to mark the site of the opposite wing. The interior of the Parthenon was used for some time as a Turkish mosque. Eight columns remain on the e. of the front, several colonnades at the sides; and of the back pediment, where the combat of Minerva and Neptune was sculptured, nothing remains save the head of a sea-horse, and two decapitated female figures. Of the pediment in front, several figures belonging to the group representing the birth of Minerva are preserved in the British Museum, and justly regarded as masterpieces of ancient sculpture. Of all the statues which the Parthenon contained, only one, that of Hadrian, has been preserved. Ruined as it has been, the general aspect of the Parthenon is still sublime. Of the Erechtheium (or Temple of Neptunus Erechtheius) there are considerable remains, especially the beautiful female figures styled Caryatides.

The situations and vast extent of the two theatres may still be traced, though grain is now grown in the arenas. All these remains belong to the Acropolis. In the city below, there are no such splendid memorials. The Horologium, or octagonal Temple of the Winds (built by Andronicus Kyrrhestes), has been well preserved; but a few fragments found in broken walls are all that remain to tell of the splendid Gymnasium built by Ptolemæus. Beyond the city, the attention of the spectator is arrested by the sublime ruins of the Temple of Jupiter Olympus. Pedestals and inscriptions have been found here and there, sometimes buried in the earth. The sculptures on the friezes of the interior of the Temple of Theseus, representing the exploits of Theseus, have been well preserved, while the external sculptures are almost utterly destroyed. A Turkish burial-place now occupies the hill where the Areopagus held its sittings. The site of the Lyceum is indicated only by scattered stones, and a modern house and garden occupy the place of the Academy. Scarcely anything remains to show the old magnificence of the harbors Piræus, Phaleros, and Munychia.

It is probable that, in the time of Pausanias, many structures remained belonging to the period before the Persian war, as Xerxes, during his short time of mastery over A., would scarcely have been able to destroy more than the fortifications and principal public buildings. Themistocles, in his restoration of the city, had chiefly a regard to utility; Cimon paid attention to its decoration; but Pericles far exceeded them in the magnificence of his designs, which were too vast to be carried into effect in later times. The

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civilization, spreading from A. as its centre, raised Macedon and other states into dangerous rivalry. The defeat at Chæroneia was as fatal to the fine arts as to the liberty of the Athenians. After the works at the Piræus had been destroyed by Sulla, the naval power, and with it the whole political importance of A., rapidly declined. It is true that the city was treated leniently by its conquerors; the temples and statues were preserved from violation, and A., with all the trophies of eight centuries of greatness, remained under the Antonines; but the free national spirit of the Athenians had departed for ever, and slowly, but surely, the fine arts shared the fate of Grecian liberty. Their treasures, which had been spared by the Roman emperors, were gradually stolen away by various thievish collectors, especially for the decoration of Byzantium, or were destroyed by unthinking Christian zeal and barbarian invasion. About A.D. 420, the ancient religion and temple-service of A. had entirely disappeared; afterwards, the schools of philosophy were closed by Justinian, and Greek mythology was gradually forgotten. St. George took the place of Theseus, and the Parthenon was converted into a church. The surviving industry of A. was injured by Roger of Sicily, who removed its silk manufactures. In 1456, A. fell into the hands of Omar, and, to consummate its degradation, under the low, sensual Turks, the city of Athene was regarded as an appanage of the harem, and governed by a black eunuch. The Venetians, having captured the city in 1687, intended to carry away as a trophy the quadriga of victory from the w. front of the Parthenon, but shattered it in their attempt to remove it. In 1688, A. was again delivered into the hands of the Turks, and the work of demolition now proceeded rapidly. The grand remains of antiquity were used as quarries to supply materials for all ordinary buildings, and, in the course of another century, the city was reduced to its lowest point of degradation.

Modern A. (styled by the Turks Athina or Setines) is now the capital of the new kingdom of Greece. Previous to the Greek revolution (1821), it was a provincial city of inferior importance, the seat of a Greek metropolitan bishop, and under the jurisdiction of the Turkish governor in Eubœa. In 1821, the war of liberation commenced, and the Turks surrendered Athens in the following year; but again captured it in 1826, and took the Acropolis in 1827. After this it was left in ruins until 1830, when Attica was declared united with Greece by the protocol of the London Conference. In 1834, Otho, the son of the Bavarian monarch, who had been elected to the sovereignty of the new kingdom, removed his residence from Nauplia to A. Improvements now proceeded rapidly: Turkish manners and customs disappeared; the contemptible wooden houses and crooked streets were superseded by new ones—among which the Hermes, Æolus, Athene, and New Stadion streets are conspicuous; and, in 1836, the foundation of a new palace was laid, completed in 1843. The municipal affairs of A. are now regulated by a mayor (demarchos) and council elected by the citizens. Modern A. has a gymnasium, a

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library enriched with many donations from France and Germany, and a university, where about 52 professors and tutors are engaged. The number of students is about twelve hundred. Much literature is published here. The French and United States governments have each founded an Archæological Institute in the city. A. has soap-works, leather-works, and silk and cotton factories. It is connected with Piræus (q.v.), its port, by rail. Pop. (1889) 107,846.

Political History of A.—It was the Ionic race that manifested most signally the distinguishing characters of Greek civilization; and of this portion of Hellas, A., in the brilliant part of its history, stands out most prominently. According to tradition, its political power was first established by Theseus, King of Attica, who made A. the metropolis. Here he instituted the great popular festival of the Panathenæa, and, by encouraging settlements in the city, greatly increased its population. He divided the citizens into three classes: nobility, agriculturists, and mechanics. Until the death of Codrus, B.C. 1068, A. was governed by kings; afterwards, by archons elected from the nobility. The time of holding office was limited to ten years, B.C. 752, and to one year B.C. 683, when nine archons were annually elected, one being called the *archon eponymus*, because the year was distinguished by his name. Here begins the authentic history of A. These archons, together with the council of nobles, afterwards called the Areopagus, exercised the whole power of the state, and administered justice. The Athenian government was thus, like all other Hellenic governments, an oligarchy; but the changes introduced by the archon Solon, B.C. 594, though remarkably moderate, laid the foundation of that democratic constitution which was perfected by Cleisthenes. The condition of the population at the time of Solon was one of extreme suffering and discord, arising chiefly from the oppressive execution, by the aristocratic archons, of the law of debtor and creditor. This law was of old extremely harsh in Greece as well as in Rome; it assigned the debtor that could not fulfil his contract as the slave of his creditor. The great part of the soil of Attica was in the hands of the rich, and the mass of the population, who tilled the lands as tenants, were either in hopeless arrears, or already, with their families, actual slaves. Driven to desperation, the populace were ready to rise in mutiny; the oligarchy were afraid or unable to enforce the laws; and thus it was agreed to confer dictatorial power on Solon, well known for his wisdom, integrity, and sympathy with the people, and allow him to solve the problem. The disease being desperate, Solon applied the desperate remedy of abolishing existing contracts, liberating those that had been reduced to slavery, and forbidding for the future any one from pledging his own person or that of a member of his family. He next reformed the political constitution by dividing the freemen into four classes, according to the amount of their property. It was only the richer classes that paid taxes and were eligible to the offices of state; but all had votes in the assembly that elected the archons,

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and all sat in judgment on their past conduct, on the expiry of their year of office. The government, though still oligarchical, was thus modified in the direction of democracy by popular control. Its free operation was for some time (B.C. 560–510) interrupted by the usurpation of Peisistratus and his sons, whose *tyranny*, however, was mild and enlightened, the forms at least of the Solonian constitution being preserved.

On the banishment of the Peisistratidæ (B.C. 510), a further political reform was introduced by Cleisthenes, who extended the basis of the constitution, and rendered it essentially democratic. To Cleisthenes is ascribed the origin of the practice called *ostracism* (q.v.).

Then followed the brilliant period of the Persian war, when out of the circumstances which had seemed to threaten destruction, A. rose to the highest point of power and prosperity. Miltiades at Marathon, and Themistocles at Salamis, gained the victories which infused new courage and enthusiasm into the Greek nation. The period between the Persian war and the time of Alexander the Great, B.C. 500–336, was the most glorious in Athenian history; and in 444, Cimon and Pericles raised the city to its highest point of grandeur and beauty. But under Pericles, the beginning of a decline took place, through the decay of ancient morals and the Peloponnesian war, which ended in the capture of A. by the Lacedæmonians. After this, A. retained only the shadow of its former power and dignity. The thirty appointed ministers of government were, in fact, so many tyrants, supported by the Lacedæmonian army. After eight months of despotism had been endured, the tyrants were expelled by Thrasybulus, a free constitution was restored to A., and a new period of prosperity commenced. But it did not long endure; a formidable foe, Philip of Macedon, appeared in the north. The Athenians having opposed him in the Phocian war, Philip took from them several of their colonies. Then followed the defeat of the Athenians at Chæroneia (B.C. 338), a fatal blow. A. with other states became subject to Macedon. The free spirit of the citizens was broken, and they degenerated in moral character. After Alexander's death, a fruitless attempt was made to regain their liberty. Antipater instituted an oligarchy of wealth. Soon afterwards, A. was taken by Cassander, and placed under the rule of Demetrius Phalereus, who employed his power wisely and beneficently. Once more the old constitution of A. was restored by Demetrius Poliorcetes, and a short interval of independence was enjoyed, until the city was taken by Antigonus Gonatas. After liberating themselves from the dominion of Macedon, and joining the Achaian confederacy, the Athenians were so misguided as to support Mithridates against the Romans. This last error was fatal. Sulla conquered A., destroyed the port of the Piræus, and left only the appearance of liberty and independence, which entirely vanished in the time of Vespasian. Still, after the spirit of liberty and progress had departed, A. long remained safe from spoliation. The Romans, in their

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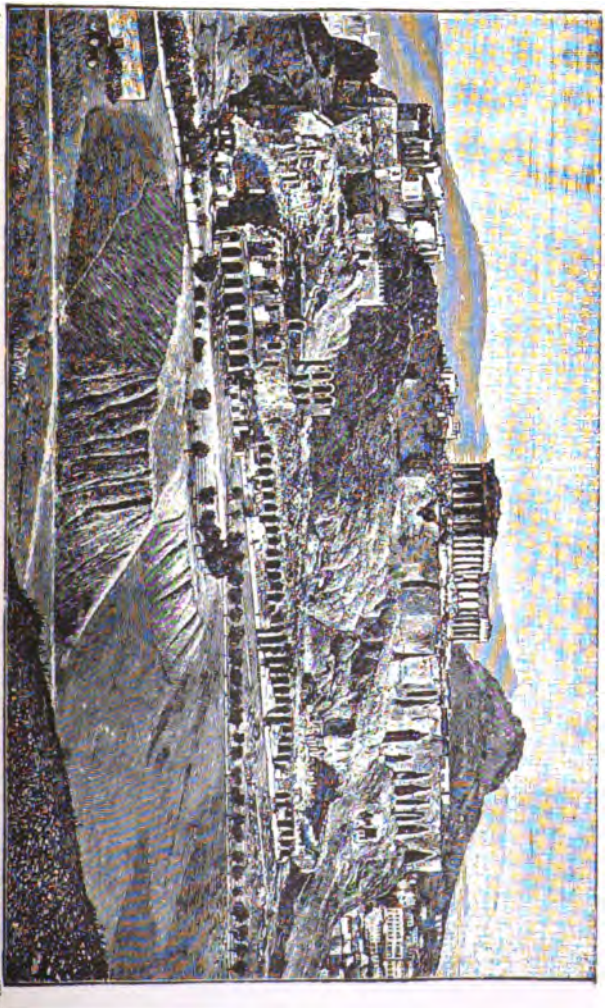

Athens.—View of the Acropolis from the Mouseion Hill, showing the ruins of the Parthenon and the Propylæa. The arches belong to the ruins of the Odeum of Herod and other buildings of the Roman period. The hill to the right is Lycabettus.

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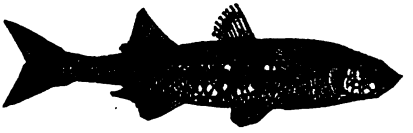
respect for Grecian pre-eminence in art and philosophy, moved also by religious reverence, long regarded Athens as a captive too noble and beautiful to suffer any indignity.

ATHENS: city of Clarke co., Ga., on the Oconee river, 135 m. n.e. of Atlanta by the Athens branch of the Georgia railroad. It has considerable cotton trade, receiving annually about 35,000 bales, 6,000 of which are consumed by the local manufactories. It has two national banks, three weekly papers, eleven churches, and is the seat of the Univ. of Georgia and the Lucy Cubb Institute. The university is non-sectarian, with agricultural, mechanical, legal, and medical departments, and has four branch agricultural colleges in different parts of the state. The Franklin College, State College, and Law School are at A. Pop. (1870) 4,251; (1880) 6,099; (1890) 8,627.

ATHERINE, *ăth'ĕ-rĭn* (*Atheri'na*): genus of small fishes, allied to the Mullet family (*Mugilidæ*), but latterly separated into a distinct family, *Atherinidæ*. The Atherines have more than twice as many vertebræ as the Mullets; they are of a rather slender form, but few of them exceed six inches in length. They have a protractile mouth, and very small teeth; some are quite toothless. Almost all the known species, which are numerous, and found in the seas of different parts of the world, have a broad silvery band along each flank. Some of them are much esteemed for their delicacy. They all congregate in great shoals. They abound in the Mediterranean. One species, *A. Presbyter*, is very common on the s. coast of England and on some parts of the coast of Ireland, but is rare on the e. coast of Britain. In the markets of some of the southern towns of



Atherine (*Atherina Presbyter*).

England, where the Smelt (q.v.) is unknown, it is sold under that name: in the United States are a few species of the family, e.g., the Common Silversides of our e. coast, 5 in., and the common Brook Silversides, 3½ in., both translucent green.

ATHERMANCY, n. *a-thĕr'man-cĭ* [Gr. *athermantos*, not heated—from *athermos*, without heat—from *a*, without; *thermos*, hot]: term used by Melloni to express the power which certain bodies have of stopping radiant heat. ATHER'-MANOUS, pertaining or relating to athermancy.

ATHEROMA, n. *ăth'ĕ-rō'mă* [Gr. or L. *atherōma*, a tumor filled with matter]: a form of fatty degeneration; a curdy tumor. A., or 'fatty deposit,' is generally found in the tissues of aged persons, or those who have lived dissipated and ill-nourished lives. In appearance, it is yellow and cheesy, showing under the microscope fatty granules and crystals of cholesterine. Its most common

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situation is between the middle and inner coats of arteries, and is dangerous, inasmuch as it interferes with the elasticity of the arterial tube, rendering it more liable to injury, and less able to repair itself, should any occur. A. generally precedes aneurism (q.v.). See ARTERIES, DISEASES OF. Cysts filled with contents resembling bread-sauce, which frequently occur in the scalp, are termed atheromatous tumors. ATHEROMATOUS, a. *ăth'ĕr-ŏm'ă-tŭs*, containing matter of the nature of atheroma.

ATHEROSPERMA, n. *ăth-ĕr-ŏ-spĕr'ma* [Gr. *ather*, the beard or spike of an ear of corn; *sperma*, seed. So called from the seed being crowned by a permanent hairy style]: genus of plants, the typical one of the order *Atherospermaceæ*.

ATHEROSPERMACEÆ, n. pl. *ăth-ĕr-ŏ-spĕr-mā'sē-ē* [from the typical genus *atherosperma*]: an order of exogenous plants placed by Lindley in his Menispermal Alliance. Their English name is *plume nutmegs*. They are unisexual plants, having neither calyx nor corolla, but only an involucre. In the male flowers the stamens are numerous; in the female, they are less so. Each involucre has several ovaries, with solitary erect ovules, which afterwards become feathered at the summit by the persistent styles. They are natives of New Holland and South America. In 1846, Lindley estimated the known species at four only.

ATH'ERSTONE: market-town of Warwickshire, England; on the borders of Leicestershire, 16 m. n.e. from Birmingham; on the Roman road called Watling Street. The town is irregularly built; many houses are very ancient. Pop. 4,000.

ATHETOSIS, n. *ăth-ĕ-tō'sĭs* [Gr. *athetos*, unfixed, changeable]: disease in which the patient is unable to control the slow and irregular movements of fingers and toes which are due to some spinal or cerebral disturbance. ATHETOID, resembling or pertaining to.

ATHIRST, a. *ă-thĕrst'* [AS. *a*, on, and *thirst*]: thirsty; wanting drink.

ATHLETE, n. *ăth'lēt*, plu. ATHLETES, *ăth-lē'tēz*, or *ăth-lēts'* [Gr. *athlētēs*, a wrestler—from *athlos*, a contest]: a wrestler; one who contends in public games in trials of strength. ATHLETIC, a. *ăth-lĕt'ĭk*, pertaining to trials of strength; strong; robust; vigorous. ATHLET'ICALLY, ad. *-kăl-ĭ*. ATHLETICISM, n. *ăth-lĕt'ĭ-sĭzm*, the art of training one as an athlete; the state of being so trained; athletics. ATHLETICS, n. *ăth-lĕt'ĭks*, the art of developing muscular strength for the sake of prize or other contests, or for the ordinary physical work of life. ATHLETISM, n. *ăth'lĕ-tĭzm'*, muscular strength

ATH'LETE: a combatant, pugilist, wrestler, or runner, in ancient Greece. Athletics were studied in Greece as a branch of art, and led to several useful rules of diet, exercise, etc., applicable to ordinary modes of life. Bodily strength and activity were so highly honored by the Greeks, that the A. held a position in society totally different from that of the modern pugilist. When he proposed to enter the lists at the Olympic or other public games, he was examined

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with regard to his birth, social position, and moral character. A herald then stepped forth and called upon any one, if he knew aught disgraceful to the candidate, to state it. Even men of genius contended for the palm in athletic exercises. Chrysippus and Cleanthes, the famous philosophers, were victorious athletes, or at least *agonistæ*, i.e. persons who pursued gymnastic exercises, not as a profession, but for the sake of exercise. The profound and eloquent Plato appeared among the wrestlers in the Isthmian games at Corinth, also in the Pythian games at Sicyon. Even the meditative Pythagoras is said to have gained a prize at Elis, and gave instructions for athletic training to Eurymenes, who afterwards gained a prize at the same place. So great was the honor of an Olympian victor, that his native city was regarded as ennobled by his success, and he himself considered sacred. He entered the city through a special breach made in the walls; he was supported at the public expense; and when he died, was honored with a public funeral. Euthymus, of Locri in Italy, who had, with only one exception, been regularly victorious at Elis, was honored with a statue, to which, even during his lifetime, homage was paid by command of an oracle. Athletic sports, first witnessed at Rome B.C. 186, were introduced by M. Fulvius at the end of the Ætolian war, and became excessively popular in the time of the emperors. At Rome, the athletes formed a corporation.

ATHLONE, *ăth-lōn':* small town in the centre of Ireland, on both sides of the Shannon, chiefly in the county of Westmeath, but partly in that of Roscommon. It is the largest town between Dublin and Galway, and lies on a commanding situation, 3 m. below Lough Ree, in a carboniferous limestone district. The chief manufactures are felt hats, friezes, linens, and stays. A canal here, a mile long, enables large river steamers to navigate the Shannon for 116 m. from Killaloe to Carrick-on-Shannon, uninterrupted by the river rapids. The Shannon is crossed by a fine bowstring and lattice iron bridge of two arches, 175 and 40 ft. span. Till 1885 A. returned one member to parliament. A. Castle, on the Roscommon bank of the Shannon, founded in the reign of King John, is now one of the chief military positions in Ireland. The fortifications cover 15 acres, and contain barracks for 1,500 men. Pop. of A. 6,755.

ATHOL, *ăth'ŭl:* post village in Worcester co., Mass.: on Miller's river, from which great water-power is obtained. It is 70 m. w.n.w. of Boston, 28 m. n.w. from Worcester, 48 m. n.e. from Springfield; at the junction of the Boston and Albany and the Fitchburg railroads. It has three banks, two being national and one savings, and publishes two weekly papers. There are considerable manufactories of boots, shoes, woolens, etc. Pop. (1870) 3,517; (1880) 4,307; (1890) 6,319.

ATHOLE, *ă'thŭl* [Pleasant Land]: a dist. of 450 sq. m., in the n. of Perthshire, occupying a great part of the s. slopes of the Grampian Mountains, and intersected by

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many narrow glens, down which flow the rapid tributaries of the Tay. It is chiefly composed of gneiss and quartz rock, with beds of primary limestone. Dr. Hutton's explorations among the granite veins in Glen Tilt were among the chief means of establishing the Plutonic theory of geology. A. was once one of the best hunting districts in Scotland. Athole deer-forest is said to contain 100,000 acres, and 10,000 head of deer, of which 100 are killed annually. In the picturesque Pass of Killiecrankie, in this district, 17 m. n.w. of Dunkeld, Claverhouse fell in 1689, though victorious over the troops of King William III.

A'THOR, or ATHYR, but properly, *Het-her*, i.e., 'the habitation of God': an Egyptian goddess who, in the mythological system of that people, is ranked among the second class of deities. She was the daughter of Ra, the sun. By the Greeks, she was identified with Aphrodite (Venus). The cow was regarded as her symbol, and in hieroglyphics she generally appears with the head of that animal bearing between her horns the figure of the sun's disk. A. is also represented as a cow itself, and as a bird with human face, horns, and the sun's disk. On the oldest monuments, she is frequently portrayed bearing a temple on her head, as in the Athor-capitals of the Ptolemaic buildings, falsely supposed to be heads of Isis. Originally, the goddess had a cosmogonic significance; later, she was called the 'mistress of dance and jest,' and held in her hands, as symbols of joy, the cord of love and the tambourine. Queens and princesses were often represented by the figure of A. Her worship was general in Egypt. Her most sacred abode was at Denderah. After her the third month of the Egyptian year was named.

ATHOS, *ăth'ŏs*, HA'GION O'ROS, or MON'TÉ SAN'TO, i.e., the Holy Hill: the principal mountain of a chain extending in a peninsular form, from the coast of Macedonia into the Ægean Sea, between the gulfs of Contessa and Monté Santo, and connected with the mainland by a narrow isthmus. The length of the peninsula is 40 m.; breadth, 4 m. According to tradition, it received its name from A., son of Neptune, or from A., a giant who battled against the gods. The highest summit in the chain, or Mount A. proper, a solitary peak at the s. extremity of the peninsula, rises 6,350 ft. above the sea. In ancient times, several towns were built on A. Herodotus mentions five. The most memorable thing in connection with A. is the canal which Xerxes cut through the isthmus, in order to escape the stormy gales which rendered the navigation round the promontory very perilous, and which had shattered the fleet of Mardonius some years before. Traces of this canal still exist. In the middle ages, A. was covered with monasteries, of which 20 remain (besides several hermitages, chapels, etc.). The largest are the monasteries of Ivoron and St. Laura; the richest, Vatopædi. The entire number of monks who inhabit the 'Holy Hill' is about 8,000. They form a kind of monastic republic

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under the Turkish government, to which they pay an annual tribute of nearly $20,000. The monks follow the rule of St. Basil, and lead an ascetic life, engaged chiefly in agriculture, gardening, and the care of bees. In diet, they restrict themselves to herbs, fruits, and fish. They carry on a considerable trade in amulets, images, crucifixes, wooden articles of furniture—all of their own manufacture—and reap profits from the numerous visits of pilgrims. Caryes, the principal place in the peninsula, is picturesquely situated in the midst of vineyards and gardens, and has 1,000 inhabitants. Here the market is held; but no female, even of any animal, is permitted to be present, or even to enter the peninsula. In the middle ages, A. was the centre of Greek learning and Christian-Byzantine art. Now, scarcely more than two or three monks, of moderate education, can be found in a monastery. The libraries are neglected, though containing several beautiful (but not important) old manuscripts.

ATHRIXIA, n. *a-thrĭks'ĭ-a* [Gr. *athrix*—from *a*, without; *thrix*, hair, in allusion to the absence of hairs from the receptacle and the stigmas of the ray]: genus of plants belonging to the order *Asteraceæ*, or *Compositæ*. *A. capiensis* is a pretty greenhouse shrub, with narrow lanceolate leaves and bright crimson, solitary heads of flowers.

ATHWART, prep. *ă-thwawrt'* [AS. *a*, on, and *thwart: on thirt*, an accommodation of Icel. *um-thvert*, across]: across; from side to side: AD. among *seamen*, across the line of the ship's course; in a manner to cross or perplex; from side to side of a ship, in contradistinction to 'fore and aft.'

ATHY, *a-thī':* small town in the s.w. of Kildare county, Ireland, on the e. side of the river Barrow, here joined by the Grand canal. It lies in a carboniferous limestone district. Its chief export is grain. Pop. (1881) 4,181.

ATHYMIA, n. *a-thī'mĭ-a* [Gr. *athumia*—from *athumeō*, to be down-hearted—from *a*, without; *thumos*, the soul as the seat of passion]: faint-heartedness; despondency.

ATHYRIUM, n. *ă-thĭr'ĭ-ŭm* [Gr. *a*, without; *thurion*, a little door; a wicket]: genus or sub-genus of ferns.

ATILT, ad. *ă-tĭlt'* [AS. *a*, on, and *tilt*]: in the position of a man making a thrust; in the posture of a barrel raised behind that the liquor may run out.

ATIMY, n. *ăt'ĭ-mĭ* [Gr. *atimia*, dishonor—from *atimaō*, to dishonor—from *a*, without; *timē*, worship, honor; *tiō*, to pay honor]: in ancient *Greece*, infamy; public disgrace inflicted on those who had been guilty of certain offenses.

A-TIPTOE, ad. *ă-tĭp'tō* [AS. *a*, on, and *tiptoe*]: on tiptoe.

ATITLAN, *ä-tē-tlän'* (or ATITAN, *ä-tē-tän'*), LAKE: body of water in the dept. of Solola, Guatemala. It is 24 m. long 8 to 10 m. wide, and a line of 1,800 ft. has obtained no soundings. Several small streams enter it, but it has no visible outlet, and is supposed to occupy the crater of an extinct volcano. Just s. of it are the volcano of A., 12,538

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feet high, and the Indian t. Santiago de A. The lake is surrounded by high cliffs devoid of vegetation.

ATKINSON, *ăt'kĭn-son*, EDWARD, LL.D.: political economist: b. Brookline, Mass., 1827, Feb. 10. He received his education chiefly in private schools, and from his youth made a specialty of investigating economic subjects, not only political, but also domestic. He was the founder of the Boston Manufacturers' Mutual Fire Insurance Co., whose members were factory owners, agreeing to run their business on a uniform plan and by established rules. A. gave much study to the subject of railroads, their management and their effect on the movement of population and the conditions of trade; and lectured and wrote extensively concerning them. He informed himself thoroughly also on agricultural subjects, and paid attention to household matters, especially cooking. He invented a style of oven or cooking stove, called the *Aladdin Cooker*, which produced a surprising saving in fuel, and concerning which he lectured, accompanying his lectures with experiments. He interested himself in cooking-schools and charity kitchens. Dr. A. resides in Boston. Among his more important addresses are *Banking*, delivered at Saratoga 1880 before the American Bankers' Assoc.; *Insufficiency of Economic Legislation*, before the American Social Science Assoc.; *What Makes the Rate of Wages;* and an address on the *Application of Science to the Production or Consumption of Food*, before the American Assoc., 1885. Among his pamphlets and books are *Cheap Cotton by Free Labor* (1861); *The Collection of Revenue* (1866); *Our National Domain* (1879); *The Railroads of the United States* (1880); *Cotton Manufactures of the United States* (1880); *The Railway and the Farmer* (1881); *The Distribution of Products* (1885); and *Prevention of Loss by Fire*, an address (1885).

ATLANTA, n. *ăt-lăn'ta* [from the *Atlantic*, in which the species occur (?)]: genus of Mollusca, the typical one of the family *Atlantidæ*. The shell, which is minute, is glassy, with a dextral operculum, though it is a dextral shell—a unique combination.

ATLANTA, *ăt-lăn'ta:* city, cap. of Fulton co., and of the state of Ga.; on the Atlanta and Florida, Atlanta and West Point, Central of Georgia, East Tennessee Virginia and Georgia, Georgia Pacific, Richmond and Danville, Seaport Air Line, and Western and Atlantic railroads; 101 m. n.w. of Macon, 171 m. w. of Augusta, 291 m. s.e. of Nashville; area 9¼ sq. m.; popularly known as the 'Gate City.' Its situation is peculiarly advantageous, 1,100 ft. above sea-level, and 7 m. from the Chattahoochie river, a site exceptionally adapted for a great commercial and railroad centre. The city is laid out in a circle 3 m. in diameter, with the Union depot in the centre.—In 1892 it had 50 m. of paved streets (cost $1,456,000); 50 m. of sewers (cost $542,000); 147 m. of sidewalk (cost $463,000); 94 m. of street railways, the greater part electric lines; waterworks system (bonded debt $1,027,000); fire dept. (cost in year $124,380); police dept. (cost 1891–2 $158,593); and electric street lights (cost in year $56,000). The city had income (1891) $1,550.141.60, (1892) $2,241,174.78, total

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$3,791,312.38; expenditure (1891-2) $3,423,340.73; balance (1893, Jan. 1) $367,975.65. In 1896 the estimated net public debt amounted to $2,956,000, while the assessed valuation of taxable property amounted to $55,131,197: the combined state, county, and city tax rate was $1.25 per $100. The debt 1892 was city bonded $3,101,000 and water bonded $1,027,000; total $4,128,000. There were 2 national banks (cap. $400,000), 9 state banks (cap. of 8 reporting $1,750,000), 1 incorporated bank (cap. $500,000), 1 private bank; 6 loan and investment cos., and 2 fire insurance cos. (cap. $500,000, assets $738,182, liabilities $214,913); and 3 daily, 22 weekly, 1 semi-monthly, and 23 monthly publications.—Of 96 churches the Meth. Episc., S. had 18 for whites and 11 for colored; Bapt. 17 for whites and 19 for colored; Presb. 9 for whites and 2 for colored; Prot. Episc. 7 for whites and 1 for colored; Congl. 4 for whites and 1 for colored; Rom. Cath. 2; and Christian, Lutheran, Adventist, and Unit., 1 each.—There were 19 public school buildings, valued at $500,000; 10,651 pupils; 134 white and 40 colored teachers; newly established night school; 12 colleges and schools for white pupils and 6 for colored; and educational expenditures $152,300. Notable educational institutions include the State Technological School (to secure which the city gave $150,000), North Georgia Female College, Atlanta Medical College, Oglethorpe College, Clark Theol. School (colored Meth.), Atlanta Univ. (colored), two business colleges, an English and German select school, an orphans' free school, Spelman Seminary (Bapt.), Morris Brown College (African Meth. Episc.), and Hebrew Orphan Home.—Its commercial tonnage and revenue during 1892, from New York, Boston, Philadelphia, Baltimore, and Providence, were 78,000,000 and $455,753 respectively; and from Cairo, Cincinnati, Columbus, E. St. Louis, Evansville, Henderson, Lexington, Louisville, Memphis, and Nashville 339,000,000 and $943,873 respectively. An official report on the manufactures of the city 1891 showed: 633 plants, $16,190,000 capital, 15,208 hands, $33,012,000 value of products; increase since 1880: 437 plants, $13,721,544 capital, 11,528 hands, $28,012,000 value of products. Principal industries, according to capital employed, were, manufacture of foundry products, 25 plants, $3,250,000 capital, 3,150 hands, $6,150,000 value of products; cotton goods, 3 plants, $1,400,000 capital, 1,100 hands, $1,500,000 products; lumber, 30 plants, $1,250,000 capital, 300 hands, $1,500,000 products; fertilizers, 7 plants, $1,250,000 capital, 300 hands, $1,500,000 products; cotton-seed oil and cake, 4 plants, $950,000 capital, 550 hands, $1,250,000 products; brick, 12 plants, $925,000 capital, 725 hands, $1,800,000 products; furniture, 9 plants, $725,000 capital, 750 hands, $2,000,000 products; bags, paper, etc., 3 plants, $350,000 capital, 500 hands, $850,000 products; planing and box mill products, 15 plants, $350,000 capital, 450 hands, $725,000 products; carriages and wagons, 18 plants, $300,000 capital, 160 hands, $2,800,000 products.—The monument to Henry W. Grady, the hospital erected as a memorial to him by popular subscription at a cost of about $100,000, the Forsythe-st. bridge (building at a cost of $130,000), the park presented

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to the city by L. P. Grant and named after him, and the extensive U. S. milit. post that the general govt. is establishing, are among recent local attractions:—Other buildings of note are the capitol, of white marble, cost nearly $2,000,000, the U. S. Custom-house and Post-office, new county court-house; chamber of commerce, Y. M. C. A. building, the Equitable Building, completed 1892 at cost of $1,000,000, and the new Kimball House, completed 1885.—The founding of the city was due to its selection as the point of departure for branch roads to Athens, Milledgeville, Columbus, and other cities, from the main line of railroad (the Western and Atlantic) between A. and Chattanooga. It was surveyed and laid out 1844–5, named first Terminus, afterward Marthasville, and 1847, when incorporated, Atlanta. The first building in A. was a log hut, 1836; the first store was opened 1843; in the same year the first locomotive ran over the new railroad, and until 1864 its growth was continuous. In that year Gen. Sherman, in his famous march to the sea, occupied Atlanta, the inhabitants fled, and the city was occupied by Union soldiers. The occupation lasted until Nov., when the army departing left a mass of smoking ruins. The return of the inhabitants to their devastated homes was the beginning of a wonderful progress. As a notable historical fact, it may be stated that a factory in A. which, during the war, was used for manufacture of swords and bayonets, was afterward turned into a plow-factory.—Pop. (1880) 37,409; (1890) 65,533—of which native born 63,662, foreign born 1,871, colored 28,117; (1896, estimated) 100,000. See COTTON-STATES EXPOSITION.

ATLANTES, *ăt-lăn′tēz:* so called by the Greeks in reference to the mythical Atlas (q.v.): male figures used instead of columns. The Romans called them Telamones.

ATLANTIC, a. *ăt-lăn′tĭk,* of or pertaining to the ocean so named.

ATLANTIC: city, cap. Cass co., Iowa, on the Chicago Rock Island and Pacific r.r., 60 m. e. of Omaha. Notable buildings are the court-house and the high-school; teachers in schools 20, enrolment 1,100. The Holly system supplies water. Manufacturing establishments: pork-packing house, starch factory, cannery of vegetable products. Banks: 1 national, cap. $50,000; 1 state, cap. $60,000, undivided profits $15,000; 3 private banks. Newspapers: 1 daily, 3 weekly. Pop. (1890) 4,351.

ATLANTIC CITY, *ăt-lăn′tĭk:* popular seaside resort in Atlantic co., N. J., 60 m. s.w. of Philadelphia, and 146 m. from New York; on Absecom Beach on a sandy island, 10 m. in length, and abt. ¼ m. in width, which extends between Absecom Inlet and Great Egg Harbor Inlet, and is separated by a narrow strait from the mainland. The beach is considered one of the best and safest on the coast, and the locality is the favorite resort of the citizens of Philadelphia, besides drawing thousands from all parts of the country during the height of the season. The city is prettily laid out with broad and pleasant avenues. Pop. of city (1870) 1,043; (1880) 5,477; (1890) 13,055

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ATLANTIC OCEAN: so called either from Mount Atlas, or from the fabulous island of Atlantis: that part of the ocean that divides the old world from the new. Its extreme breadth is about 5,000 m., and its narrowest part, between Cape St. Roque in Brazil, and the nearest point in Africa, about 1,600 m. If the A. be supposed to be bounded by the polar circles, and to include the Caribbean Sea, Hudson Bay, Mediterranean Sea, and the other connected water-surfaces, it covers an area computed at 35 million sq. m. The A. is naturally divided into three portions—the n., s., and intertropical A. It has open connection with the n. and s. polar seas; and in the remarkable parallelism of its coasts, resembles rather a vast river than an ocean. Its n. half sends off numerous ramifications on both sides, some of them forming almost shut seas: on the w., Hudson's Bay, the Gulf of St. Lawrence, and the Gulf of Mexico; on the e., the Baltic, North, Mediterranean, and Black Seas. In the s., both coasts present a comparatively unbroken line; and there is a remarkable correspondence between their projecting and retiring angles, the convex coast of Brazil lying opposite to the Gulf of Guinea, and the projection of Senegambia answering to the retirement of the American coast in the Caribbean Sea.

The whole of the new world, with the exception of the narrow strip lying w. of the Andes and Rocky Mountains, belongs to the *basin* of this ocean. It drains comparatively little of the old world, as may be seen by tracing the water-shed on a map. Owing to the numerous seas and inlets connected with it, the extent of its shores is immense, over 50,000 m., several thousands more than that of the shores of the Pacific and Indian Oceans. Except near the continents, the Atlantic has few islands compared with the Pacific. The chief islands in the open ocean are Iceland, Farōe, Bermudas, Azores, Ascension, St. Helena, the Falkland Islands, South Georgia, and Sandwich Land.

The chief A. currents are two. The *Equatorial Current*, which, starting from about the island of St. Thomas, in the Gulf of Guinea, with a rate of motion varying from 18 to 24 m. a day, proceeds w. on both sides of the equator till near Cape San Roque, where it divides, one branch running s. along the coast of Brazil, and the other along the coast of Guiana into the Caribbean Sea. The velocity of this current is 24 m. a day at the point where it curves s., whence it gradually diminishes in strength as it proceeds s. to little more than 6 m. a day. Within the south A. there is a complete circulation of the waters, induced by the prevailing winds, and maintained about 12 m. a day. Its force also varies with the months, being determined by the prevailing force of the wind of each month. Its breadth varies from 200 to 400 m.; and since it is fed by currents from n. and s. of it, its temperature is considerably lower in the e. than in the w. part of its course. The other great current is the *Gulf Stream*. This, originally part of the equatorial current, after flowing past the Guiana coast, and through the Caribbean Sea, issues from the Gulf of Mexico through the Strait of Florida,

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and after following the direction of the American coast to about 40°, turns seaward, touches the great Newfoundland Bank, and gradually curving round is lost as a distinct current about the Azores. See GULF STREAM. The water of this stream is often upwards of 20° warmer than the surrounding ocean. The Gulf Stream has an immense influence on the Atlantic. Besides these great currents, the A. abounds in smaller ones, such as the northerly currents along the east Greenland and Labrador coasts (this Arctic current extending as far south as 36° n. lat., its rate being from 24 to 10 m. a day); the southerly current along the w. of Greenland; Rennel's current, w. of the Bay of Biscay; and the great current along the w. of Africa, from Morocco southward, till it is merged in the Guinea current. The whole of these currents follow in every case the prevailing winds of the regions where they flow.

Since over the whole of the e. half of the A., from abt. n. lat. 45° northward, the prevailing winds are s.w., there is over the same region a general flow of the water of the ocean towards the n.e., passing the British Isles, and thence along the coast of Norway, to some distance e. of the North Cape. It is to this flow that the mild temperatures of n.w. Europe must be referred. The amelioration of the winter climates from this cause is very great, amounting to about 30° in the Hebrides, and to fully 40° in the Lofoden Islands. This effect is directly due not to the winds alone, but to the winds and sea combined. The influence of currents on the temperature of the ocean is so great, that even in August, the isothermal of 50° touches the n. of Norway in lat. 72° n., whereas to s.e. of Newfoundland the same isothermal descends to about lat. 42° n. Again, on the meridian of 74° w., the change of temperature from lat. 40° to 35° n., or in 300 m., is 18°·0; whereas on the meridian of 20° w. from lat. 40° to 10°, a distance of 1,800 m., the change of the temperature of the sea is only 15°·0.

The temperature of the A. about the equator is, if we except the part between 20° and 35° w. long., above 80°: that of the Gulf of Guinea reaches the maximum of 85° in April; from Oct. to May it is above 80°; in June and Sept. about 80°; and in July and August it falls below 80°: that of the Caribbean Sea is above 80° from July to Oct., during the rest of the year below 80°, except in July. Between 10° and 30° lat. n., the temperature of the e. part of the A. is always from 3° to 7° colder than the w., and the maximum and minimum temperatures take place later in the year in the Caribbean Sea than off the African coast.

Much has been done recently, particularly by H.M.'s ships *Porcupine* and *Challenger*, in throwing light on the physical geography of the A. The most important of the observations are those of deep and bottom temperatures, from their connection with oceanic circulation, and the distribution of life in the depths of the sea, and the bearings of the questions thereby raised on geological speculation. See SEA. Animal life abounds at much greater depths than was formerly supposed; although beyond 6,000 ft. it gradually diminishes. A great part of the bottom of

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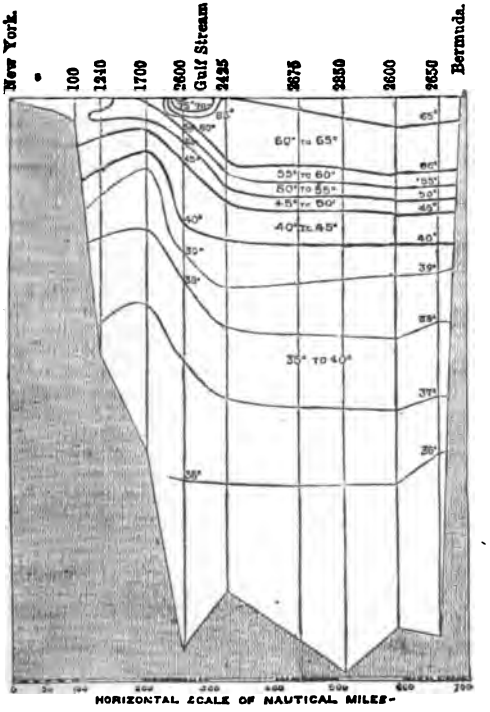
the north Atlantic is covered with slimy 'ooze,' composed for the most part of the chalk-producing *globigerina;* in very deep parts this is replaced by a brown, clay-like mud, with few traces of animal forms.

Regarding the depth of the A., it is only recently that reliable data have been obtained; along certain tracts, especially those sounded by the *Challenger*, the profile of the bottom can now be laid down with considerable certainty. The deepest sounding made by the *Challenger* with its improved method of sounding (see SOUNDINGS), is 3,875 fathoms, or 23,250 ft., at a point about 90 m. off St. Thomas, West Indies. A remarkable ridge, about 400 m. wide, and 10,000 to 12,000 ft., or 2 to 2½ m. below the surface of the sea, extends along the bottom of the A. from Cape Clear in Ireland to Cape Race in Newfoundland, 1,640 m. Along this, known as the 'Telegraph Plateau;' the Atlantic cables are laid. The accompanying diagram exhibits the depths and temperatures in the track between New York and Bermuda.



Section of the North Atlantic Ocean between New York and Bermuda:

showing the Soundings (in fathoms) and Isothermal Lines obtained in H.M.S. *Challenger*, Captain G. S. Nares, 1873.

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ATLANTIC TELEGRAPH: for submarine communication of messages between America and Europe. In 1842, Prof. Morse of New York, having stretched a submarine cable between Castle Garden and Governor's Island, New York, and succeeded in transmitting an electric current from one end to the other, expressed his opinion that it would be possible to effect an electrical communication through the sea. After further investigations, he announced to the sec. of the treasury of the United States, 'that a telegraphic communication on his plan might with certainty be established across the Atlantic.' Three years earlier, Sir William O'Shaughnessy, at Calcutta, gave practical proof that electrical messages could be conveyed through water, for short distances, by transmitting signals through a cable which he had laid across the Hoogly river; but it was not until 1854 that Mr. Cyrus W. Field of New York proposed that the project should be undertaken, and, with others, began to discuss means for its practical realization. Lieut. Maury, U.S.N., discovered that the bed of the Atlantic, between Ireland and Newfoundland, forms a kind of plateau, covered with soft ooze, favorably situated as a resting-place for a cable. See ATLANTIC OCEAN. In 1855, negotiations were carried on, partly in America, but chiefly in England, to establish a company and raise capital; which objects were attained in 1856. The 'New York and Newfoundland Telegraph Company' connected Newfoundland with the mainland of America by cables and land-wires; but 'the Electric Telegraph Company,' —all whose privileges under liberal grants and guaranties from the British and U. S. govts. passed, 1856, to a new organization, the 'A. T. Company'—undertook the laying of a cable from Newfoundland to Ireland, with a capital of $1,750,000, in shares of $5,000 each. After experiments, numbering about 2,000, with 62 different kinds of cable, to determine the one best fitted to convey electricity through such a length, and at such a depth beneath the sea, a length of 2,500 English m. of cable was ordered, and completed in the summer of 1857. The conductor consisted of 7 fine copper wires, No. 22 gauge, twisted tightly together, forming a cord $\frac{1}{12}$ inch thick, and weighing 107 lbs. per mile. This thickness was increased to $\frac{5}{8}$ inch by a core of three layers of gutta-percha. Outside the core was a jacket of hempen yarn, saturated with pitch, tar, beeswax, and boiled linseed oil. The outer sheath consisted of 18 strands, each formed of seven No. 22 iron wires. The whole diameter was about $\frac{6}{10}$ inch, and the weight one ton per mile, equal, when submerged, to abt. 14 cwt.: 332,500 m. of iron and copper wire were used in its construction. In the manufacturing processes, the wires and yarns were twisted round each other by revolving drums and circular tables worked by steam-power; while the coatings of gutta-percha were applied by forcing the substance through dies which had the copper conductor passing through their centre. The frigate *Niagara* and the line-of-battle ship *Agamemnon*, the first lent by the U. S. government and the last by the English, took 1.250 m. of the cable each, and

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steamed forth from Valentia (w. coast of Ireland), 1857, Aug. 7, the *Niagara* paying out her portion of cable as she went. On the 11th, in an attempt to slacken the the rate of paying out, the cable snapped, and the end sank in 2,000 fathoms water, at 280 m. from Ireland. The appliances on board were not sufficient to remedy the disaster, and the two ships returned to Plymouth, where the two portions of cable were placed in tanks until the next following year.

The A. T. Company raised more capital, made 900 m. additional cable, and prepared for a new attempt in 1858. The *Niagara* and *Agamemnon* were again employed; but the submersion was to begin in mid-ocean, one ship proceeding e., and the other w., after splicing the two halves of the cable. They left Valentia, June 10; but it was not till the 26th that they could finish the splice and commence the submersion. On the 29th, a double breakage took place, and 144 m. of cable went to the bottom wholly severed from the rest. The *Agamemnon* returned to England for improved appliances and further instructions; and a month was thus lost On July 29, the two ships again spliced their two halves of cable in mid-ocean, and proceeded with their work till, Aug. 6. the *Agamemnon* reached Valentia, and the *Niagara* Newfoundland, and exchanged congratulatory messages through the whole length of cable. Soon afterwards, the extremities of the cable having been put into connection with the recording instruments, the following message was flashed under the ocean in 35 minutes: 'Europe and America are united by telegraph; glory to God in the highest; on earth, peace and good will toward men.' Also greetings were exchanged between the queen and the president, and between many public bodies and official persons. The station at Newfoundland was connected by wires and cables with the general telegraphic system of America, and that at Valentia with the general system of Europe. The cable continued working until Sept. 1, sending 129 messages (averaging 11 words each) from England to America, and 271 from America to England. The signals then ceased, and the cable became useless: it had been injured by the winter's sojourn at Plymouth. Then came a great revulsion in public feeling; incredulity and ridicule took the place of enthusiasm; although a single message of the number sent was known to have saved the commercial world abt. $300,000 in insurance of vessels. Still Mr. Field did not lose his courage; indeed his efforts were redoubled on both sides of the ocean. For six years, 1858–64, the company was engaged in endeavoring to raise new capital, and to obtain increased subsidies from the English and American governments; while scientific men were making improvements in the form of cable, and in the apparatus for submerging it. At length the Telegraph Construction and Maintenance Company (formed by an amalgamation of the Gutta-percha Company with the wire-cable-making firm of Glass & Elliott) made an entirely new cable, much thicker and more costly than the former one. The conductor, 300 lbs. per mile, and ¼ inch thick,

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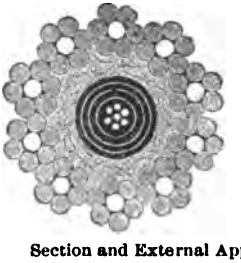
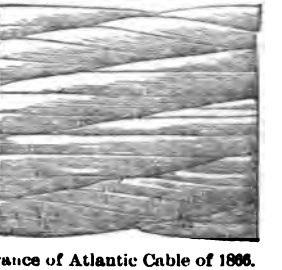
consisted of seven No. 18 copper wires, each $\frac{1}{20}$ inch thick. The core was formed of four layers of gutta-percha alternating with four of Chatterton's Compound (a solution of gutta-percha in Stockholm tar); the core and conductor together were 700 lbs. per mile, and $\frac{3}{20}$ inch thick. Outside this was a jacket of hemp or jute yarn, saturated with preservative composition. The sheath consisted of 10 iron wires, No. 13 gauge, each previously covered with five tarred Manilla yarns. The whole cable was $1\frac{1}{8}$ inch thick, and weighed $35\frac{3}{4}$ cwt. per mile, with a breaking strain of $7\frac{3}{4}$ tons.

As the cable (2,300 m.) weighed more than 4,000 tons, it was resolved to employ the *Great Eastern* steamship to carry it out and lay it. Three enormous iron tanks were built in the fore, middle, and aft holds, from 50 to 60 ft. diameter each, by $20\frac{1}{2}$ ft. deep; and in these the cable was deposited, in three vast coils. The *Great Eastern* started from Valentia, 1865, July 23, with her burden, the main cable being joined end to end to a more massive shore cable, which was drawn up the cliff at Foilhummerum Bay, to a telegraph house at the top. The electric condition of the cable was kept constantly under test during the progress of the ship; and more than once the efficiency was disturbed by fragments of wire piercing the gutta-percha, and destroying the insulation. On Aug. 2,





Section and External Appearance of Atlantic Cable of 1866.

the cable snapped by over-straining, and the end sank to the bottom in 2,000 fathoms of water, at a distance of 1,064 m. from Ireland. Then commenced the remarkable process of dredging for the cable. A five-armed grapnel, suspended from the end of a strong iron-wire rope, five m. long, was thrown overboard; and when it reached the bottom, it was dragged to and fro across the line of cable by slow steaming of the *Great Eastern;* the hope being that one or other of the prongs would catch hold of the cable. A series of disasters followed by the breaking of swivels, and the loss of grapnels and ropes; until at length, Aug. 11, it was found that there were no more materials on board to renew the grappling. The *Great Eastern* returned to England, leaving (including the operations of 1857–8) nearly 4,000 tons of electric cable useless at the bottom of the Atlantic.

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A new capital, and new commercial arrangements altogether, were needful for a renewal of the attempt. Another cable was made, slightly differing from the former. The jacket outside the core was made of hemp instead of jute; the iron wires of the sheath were galvanized, instead of being left in their natural state; and the manilla hemp which covered them was left white instead of being tarred. These few changes made it weigh nearly 500 lbs. per mile less, mainly through the absence of tar; while its strength or breaking strain was increased. Enough of this cable was made to span the Atlantic, with allowance for slack; while a sufficient addition of the 1865 cable was provided to remedy the disaster of that year.

The Atlantic telegraph operations in 1866 were remarkable and interesting. On July 13, the *Great Eastern* set forth from Valentia, with the assistant steamers *Terrible*, *Medway*, and *Albany*. The route was chosen midway between those of the 1858 and 1865 cables, for the most part a few miles from each. The *Great Eastern* exchanged telegrams almost continuously with Valentia during her progress. The mishaps were few in number, and easily remedied; and the *Great Eastern* safely entered the harbor of Heart's Content, Newfoundland, on the 27th. After this, operations commenced for recovering the end of the 1865 cable, and completing the submersion. The *Albany*, *Medway*, and *Terrible* set off, Aug. 1, to the spot on the ocean beneath which the end of the cable was lying, or as near to it as calculations could establish. Certain buoys, left anchored there twelve months previously, had been carried away by the storms of the preceding winter; but the latitude and longitude had been very carefully registered. The *Great Eastern* started from Heart's Content on the 9th, and then commenced a series of grappling operations, which continued the rest of the month. The cable was repeatedly caught, and raised to a greater or less height from the ocean-bed; but something or other snapped or slipped every time. After much trial of patience, the end of the cable was safely fished up Sept. 1; and electric messages were at once sent through to Valentia, as well as if the cable had not had twelve months' soaking in the Atlantic. An additional length having been spliced to it, the laying recommenced; and on the 8th the squadron entered Heart's Content; having thus succeeded in laying a second line of cable from Ireland to America.

With improved cables and machinery, the work has been so greatly expedited that, 1894, July 2, the *Faraday* completed the laying of a cable between Waterville, Ireland, and Canso, Nova Scotia, having laid the deep-sea portion (about 1,600 nautical m.) in 12 days. On the 27th of the same month, the *Scotia* completed the laying of the cable between Valentia, Ireland, and Heart's Content, Newfoundland, in somewhat less than 12 days.

The following lines of telegraph cables have now (1897) been laid beneath the Atlantic or some portion of it:

Anglo-American Telegraph Co.: from Valentia, Ireland, to Heart's Content, Newfoundland, 4 cables, 7,505 m.; from

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Minon near Brest, France, to St. Pierre, Miquelon (off the s. coast of Newfoundland), 1 cable, 2,718 m.

Commercial Cable Co.: Waterville, Ireland, to Canso, Nova Scotia, 3 cables, 6,888 m.; Canso, Nova Scotia, to New York, 1 cable, 828 m.; Canso, Nova Scotia, to Rockport, Mass., 1 cable, 519 m.

Direct United States Cable Co.: from Ballinskellig's Bay, Ireland, to Halifax, Nova Scotia, 1 cable, 2,564 m.; from Halifax, Nova Scotia, to Rye Beach, N. H., 1 cable, 535 m.

Western Union Telegraph Co.: Sennen Cove, near Penzance, England, to Dover Bay, near Canso, Nova Scotia, 2 cables, 5,107 m.; Dover Bay, Nova Scotia, to New York, 2 cables, 1,776 m.

Compagnie Française du Télégraphe de Paris à New York: from Brest, France, to St. Pierre, Miquelon, 1 cable, 2,282 m.; from St. Pierre to Cape Cod, Mass., 1 cable, 828 m.

Brazilian Submarine Telegraph Co.: from Carcavellos, near Lisbon, Portugal, to Madeira, Cape de Verde Island, and Pernambuco, Brazil, 6 cables, 7,369 m.

Central and South American Telegraph Co.: 15 cables, 7,496 m.

Cuba Submarine Telegraph Co.: 4 cables, 1,048 m.

Anglo-Spanish-Portuguese System: 11 cables, 3,566 m.

Direct Spanish Telegraph Co.: from Lizard Point, England, to Bilbao, Spain, 4 cables, 708 m.

Europe and Azores Telegraph Co.: 2 cables, 1,052 m.

Halifax and Bermuda Cable Co.: 1 cable, 850 m.

Western and Brazilian Telegraph Co.: 16 cables, 6,147 m.

West India and Panama Telegraph Co.: 22 cables, 4,554 m.

West Coast of America Telegraph Co.: 8 cables, 1,964 m.

West African Telegraph Co.: 12 cables, 3,055 m.

African Direct Telegraph Co.: 8 cables, 2,749 m.

There are, besides the lines above specified, numerous cables along the various coasts, the lines along the American coasts aggregating more than 2,000 m.

The means of grappling and raising cables in mid-ocean, as well as of ascertaining the exact location of any break, have been carried to such perfection that any needed repairs are readily made. See TELEGRAPH.

ATLANTIDÆ, n. pl. *ăt-lăn'ti-dē:* in *ethn.*, according to Latham, one of the primary varieties of the human species. The maxillary profile is projecting; the nasal one generally flat; the frontal one retiring; the cranium dolichocephalic, the parietal diameter being generally narrow; eyes rarely oblique; skin often jet black, very rarely approaching a pure white; hair crisp, woolly, rarely straight, still more rarely light-colored. Languages with an agglutinate, rarely an amalgamate inflection. Distribution, Africa. Influence on history of the world, inconsiderable.—In *zool.*, family of molluscs belonging to class *Gasteropoda*, order *Nucleobranchiata*. There is a symmetrical discoidal shell, sometimes closed by an operculum. The gills are contained in a dorsal mantle-cavity.

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ATLAN'TIS. according to ancient tradition, a vast island in the Atlantic Ocean. It is first mentioned by Plato, who represents an Egyptian priest as describing it to Solon, but, of course, according to Plato's view of the matter. In this description, A. appeared as an island larger than Libya and Asia Minor taken together, and lying off the Pillars of Hercules in the Atlantic Ocean. Plato gives a beautiful picture of the interior of this imaginary land, and enriches it with a fabulous history. Some early writers supposed that the Canary Islands were the remains of the old A.; for Plato had stated that at the close of the long contest which its inhabitants maintained against the Athenians, nine thousand years before his time, the sea suddenly engulfed the island, and had ever since been unnavigable, by reason of the shoals of mud created by the sunken island. Some found it in the Scandinavian peninsula; others (first Bircherod, 1685) have supposed the vast island of A. mentioned by Plato, as well as the great unnamed island spoken of by Pliny, Diodorus, and Arnobius, may have been the new world. For curious array of evidence that A. was the scene of the first civilization and the deluge, see *Atlantis*, by Ignatius Donnelly.

ATLAS, n. *ăt'lăs*, ATLASES, n. plu. *ăt'lăs·ĕz* [Gr. *Atlas*, name of a giant who, the ancient Greeks pretended, bore up the earth upon his shoulders]: a collection of maps bound together; the first vertebra or top joint of the neck, or that which supports the head. ATLANTES, n. plu. *ăt-lăn'tēz*, in *arch.*, the whole or half figures of men employed instead of columns or pillars. ATLANTEAN, a. *ăt'lăn·tē'ăn*, or ATLANTIAN, a. *ăt-lăn'shĭ-ăn*, pertaining to Atlas, or to the isle of Atlantis; strong; gigantic. ATLANTIDES, n. pl. *ăt-lăn'tĭ-dēz* [L. *Atlantides*, *Atlantiades*]: in *class. myth.*, the daughters of Atlas, seven of whom were called also Pleiades, after their mother Pleione. After their death they were supposed to have been transformed into the constellation Pleiades; in *astron.*, a designation sometimes given to the stars constituting the Pleiades.

AT'LAS: that piece of the human vertebral column which is nearest to the skull; in other words, it is the first cervical vertebra. It may be known from the other six by its being without a body or spinous process, by its being a mere irregular bony ring, partly divided into two unequal parts by a constriction; this division in the recent subject is completed by a ligament, the part in front being occupied by the tooth-like process of the second cervical vertebra, and that behind, by the spinal-marrow. On each side, the ring is very thick; it is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat, and rest on the second cervical vertebra.

The A., with the occipital bone, forms the joint on which the head moves in bowing; and turns on the pivot of the second cervical vertebra, when the head is moved from side to side.

AT'LAS, in Ancient Myth.: according to Hesiod's *Theog-*

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ony, one of the Titans, son of Iapetus and Clymene, bro. of Menœtius, Prometheus, and Epimetheus. Apollodorus, however, states him to have been a son of Asia, and Hyginus, a son of Æther and Gaea. He married Pleone, daughter of Oceanus (or Hesperis, his own niece), and became the father of the Pleiades. As leader of the Titans, he attempted to storm the heavens, and for this supreme treason was condemned by Zeus to bear the vault of heaven on his head and hands—the sting of this mythological punishment obviously being, that A. was compelled to support what he thirsted to destroy. The later writers, however, rationalize the myth, and state that A. was a mighty king who had great skill in astronomy, and only tried to storm heaven intellectually.—In consequence of the ancient views which made the vault of heaven rest on solid pillars or other supports, the name A., originally mythological and cosmogonic, was introduced into geography. Mercator, in the 16th c., gave the name A. to a collection of maps; probably because the figure of A. supporting the heavens had been given on the title-pages of such works.

AT'LAS: a mass of mountain-land in the w. part of n. Africa. Herodotus mentions a smoking mountain of this name situated on the s.w. of the Little Syrtis, twenty days' journey w. from the Garamantes, styled by the natives the 'pillars of heaven.' By later writers, after the time of Polybius, the name A. was always given to the chain of mountains in n.w. Africa extending from the island of Cerne (now Cape de Ger) n.w. through Mauritania, and Tingitana (now Fez and Morocco), and including also the heights dispersed through the region of Sahara. It is divided into the Little Atlas and the Great Atlas; the former denominating a secondary range in the country of Sous, and the other the loftier mountains of Morocco. The A. is not properly a mountain-chain, but rather a very irregular mountainous mass of land formed of many chains running in various directions, meeting in mountain-knots, or connected by yokes, or short chains of inferior height, and diversified still further by several solitary mountains and groups of mountains. The A. attains its greatest height (13,000 ft.) in Morocco, the only part where it rises above the snow-line, and obtains the name of Jebel-el-Thelj, or Snowy Mountains. Its highest peaks are Miltsin —27 m. s.e. of the city of Morocco—Bibawan, and Tagherain. The most southern chain diverging here from the central mass bears the name Jebel-Hadnar. The heights approach the sea, and form the promontories jutting out into the Atlantic. From Morocco, the A. gradually decreases in height towards the e. In Algeria, the elevation is only 7,673 ft.; in Tunis, 4,476 ft.; and in Tripoli, 3,200 ft. The whole mountain-system is intersected by the valley of the Muluia river, which flows through the n.e. part of Morocco, and falls into the Mediterranean. The slopes on the n., w., and s. are covered with vast forests of pine, oak, cork, white poplar, wild olive, etc. The valleys are well watered and capable of cultivation with great profit. The A. seems to be chiefly calcareous in its composition.

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The mineral wealth remains almost wholly unexplored, though copper, iron, lead, antimony, etc., are reported to exist in abundance.

ATLASITE, n. *ăt'lăs-īt* [apparently from Ger. *atlas*, satin, named from the satiny or silky character of the mineral. The term corresponds to Ger. *atlaserz*, fibrous malachite]: a mineral believed to be a possible mixture of azurite and atacamite. It is a copper carbonate that contains chlorine.

ATMIDOMETER, n. *ăt-mĭ-dŏm'ĕt-ĕr* [Gr. *atmidos*, genit. of *atmis*, the steam of a fomentation. Cognate with *atmis*]: an instrument still in use, invented by Babington, for measuring the evaporation from water, ice, snow, etc. It consists of two glass or metal bulbs, one of them placed above the other, with which it communicates by a narrow neck. The lower one is weighted with shot or mercury, and the upper has on it a small glass or metal stem, with a scale graduated in grains and half-grains. On the top of all there is a shallow pan. The instrument being immersed in a vessel of water through a circular hole in which the stem rises, distilled water is gradually poured into the pan above, causing it to sink to the point at which the zero of the stem is on a level with the cover of the vessel. As then the water in the pan gradually evaporates, the stem slowly ascends, the amount of evaporation being indicated in grains on the graduated scale.

ATMOLOGY, n. *ăt-mŏl'ŏ-jĭ* [Gr. *atmos*, vapor; *logos*, discourse]: the science of vapor. AT'MOLOG'ICAL, a. *-lŏj'-ĭ-kăl*, pertaining to the science of vapor. ATMOL'OGIST, n. *-ŏ-jĭst*, one who.

ATMOLYZE, v. *ăt mŏ-līz'* [Gr. *atmos*, smoke or steam; *lusis*, a loosing or setting free—from *luō*, to loose]: to separate, at least partially, two gases or vapors of unequal diffusibility, which are combined with each other. ATMOLYSIS, n. *ăt-mŏl'ĭ-sĭs*, the act or operation of separating two gases in combination, from each other.

ATMOMETER, n. *ăt-mŏm'ĕ-tĕr* [Gr. *atmos*, vapor; *metron*, a measure]: an instrument for measuring the amount of evaporation from any moist surface in a given time: sometimes termed ATMIDOMETER. It was invented by Sir John Leslie, and consists of a very thin ball of porous earthenware, from one to three inches in diameter, having a small neck firmly cemented to a long and rather wide tube of glass, to which is adapted a brass cap with a narrow collar of leather to fit closely. It is filled with distilled or pure water, and its cap screwed tightly. It is then suspended out of doors in a situation where it is exposed freely to the action of the wind, but it is sheltered from rain. As the water evaporates from the external surface of the ball, it transudes through its porous substance, and the waste is measured by the corresponding descent of the liquid in the stem. To test the amount of this descent, there is a finely-graduated scale. When the water has sunk to the bottom of the stem, the latter requires to be filled again. The accuracy of the A, is only approximate.

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ATMOSPHERE, n. *ăt'mŏs-fĕr* [Gr. *atmos*, vapor; *sphaira*, a sphere]: the whole mass of air, clouds, and vapor surrounding the earth. ATMOSPHERIC, a. *ăt'mŏs-fĕr'ĭk*, or AT'MOSPHER'ICAL, a. *-ĭ-kăl*, pertaining to the air; produced or operated on by the atmosphere. AT'MOSPHER'ICALLY, ad. *-lĭ*. AT'MOSPHER'IC PRESSURE, the weight of the atmosphere on a surface, being about 15 lb. to the square inch at the level of the sea. ATMOSPHER'IC TIDES, tides which must exist in the atmosphere as they do in the ocean, from the attractions of the moon and sun.

AT'MOSPHERE: the gaseous envelope which surrounds the earth. The A. is indispensable to animal and vegetable life, the modifying and retaining of solar heat, the transmission of sound, the gradual shading of day into night, the disintegration of rocks, and the occurrence of weather phenomena. In consequence of the action of gravity, the A. assumes the form of a spheroidal stratum concentric with the earth and presses heavily on its surface. It exhibits, in common with all fluid bodies, the usual characteristics of hydrostatic pressure, but its internal condition differs from that of a liquid inasmuch as its particles repel each other, and can only be held in proximity by external force. From this, it follows that the volume of any portion of air varies much more under the influence of external pressure than that of an equal volume of water; hence, the stratum of air nearest the earth is denser than strata in the upper regions, where, from their being subjected to the weight of a smaller mass of superincumbent air, the repulsive force of the particles has freer play.

That air has *weight*, is illustrated by the following simple experiment. If a hollow glass globe of five or six inches in diameter be weighed, first when filled with air, then after the air has been extracted from it by means of the air-pump, it will, when thus exhausted, weigh sensibly less than it did before, and the difference of the two results will represent the weight of the quantity of air withdrawn. It has been determined by Biot and Arago that 100 cubic inches of dry air, when the barometer is at 30 inches, and the thermometer at 60° Fahrenheit, weigh 31·074 grains. The law of Archimedes (see ARCHIMEDES, PRINCIPLE OF), that a body immersed in a fluid loses a part of its weight equal to the weight of the volume of fluid displaced by it, finds its application in the A. as well as in water. If a glass globe filled with air and closed be suspended at the extremity of the beam of a delicate balance, and be kept in equilibrium by a brass weight at the other extremity, and if the whole be then placed under the receiver of an air-pump, and the air extracted, the equilibrium previously existing in air will be disturbed, and the larger body will become the heavier. The reason of this is, that when first weighed, they each lose as much of their own weight as that of the respective volumes of air displaced by them, and are therefore made buoyant, though in different degrees, the ball with the larger volume having the greater buoyancy. In a vacuum, they are deprived of this buoyancy, and the larger body, suffering the greater loss, becomes

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sensibly heavier than the other. In like manner, a balloon filled with heated air or hydrogen gas is lighter than the volume of air displaced by it. It is therefore forced upward until it reaches a stratum of such density that the weight of the volume of air there displaced by it equals the weight of the balloon itself. In this stratum it will remain poised, or move horizontally with the currents to which it may be exposed.

In endeavoring to determine the *form* of the atmospheric envelope, it is necessary to bear in mind that, according to the law of fluid-pressure, in order to produce a state of equilibrium at the level of the sea, the pressure of the A. must be equal at that level over the whole of the earth's surface. Gravity acts with less force on the air at the equator than on that at the poles, in consequence of the spheroidal form of the earth. It has therefore, in addition, to contend with the centrifugal force, which entirely fails at the poles, and which has a tendency to lighten the air by acting contrary to gravity. Hence we infer, that, in order to produce the same pressure at the level of the sea, the atmospheric height at the equator must be greater than that at the poles, and that the A. must therefore possess the form of an oblate spheroid, whose oblateness is considerably greater than that of the earth itself. The greater heat at the tropical regions must also have the effect of increasing the oblateness.

The *height* of the A. has not yet been determined. That it must have a certain limit, is evident from the consideration that there must be a point at which gravity on the one hand, and centrifugal force and the repulsive action of the particles on the other, are poised, and beyond which —the latter forces overbalancing the former force—the aerial particles would be borne away from the earth. As, however, the law of the diminution of temperature, which materially affects the repulsive action, is unknown for the upper regions of the air, it is impossible to calculate the height of the atmosphere from the relations of these forces. From the observation of luminous meteors, it is inferred that it is at least 100 m. high, and that, in an extremely attenuated form, it may reach 200 m.

The *pressure* of the A. is one of its most important properties. Its effect is exhibited in the action of the ordinary water-pump. The piston is fitted air-tight in its cylinder, and on being drawn up creates a vacuum. The water within the pump, being thus freed from pressure, while that outside of it is exposed to the pressure of a column of air reaching to the surface of the A., is at once forced up by reason of the weight of air which it must rise to balance. The ascent of the water takes place until the piston has reached the height of nearly 34 ft., from which we conclude that a column of air is equal in weight to a column of water of the same horizontal section, and of the height of nearly 34 ft. As mercury is 13·6 times heavier than water, a mercurial column freed from atmospheric pressure at the one extremity, and subjected to it at the other, is 13·6 times less in height than the column of water, or

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about 30 inches. From the more convenient size of this column, mercury has been adopted as the standard for atmospheric pressure, and is employed in ordinary barometers (q.v.). A mercurial column 30 inches in height and 1 square inch in section weighs 15 lbs. (more accurately 14·73), which gives the equivalent weight of a column of atmospheric air of the same section.

The word A. is often employed to express this weight or pressure on a sq. inch of surface, so that when we speak, in Mechanics, of the pressure of steam on a boiler as amounting to three atmospheres, we mean a pressure of 45 lbs. on the sq. inch. The pressure of the A. on a sq. inch being thus ascertained, we have merely to multiply it by the number of sq. inches on the earth's surface to obtain the total weight of the A. It amounts to 11·67085 trillions of lbs. or about $\frac{1}{1850000}$ of the earth's mass. It must be observed that the height of the barometric column is not a constant quantity, as it varies with the latitude, the season of the year, and the hour of the day. At London its mean height is 29·88 inches; at Paris, 29·92 inches. The pressure of the A. in the northern hemisphere increases as we recede from the equator, reaching a maximum at 30° n. lat., and decreasing from 30° to 65°, where it again begins to rise. The greater height at 30° is said to be due to the accumulation of air at that latitude by the action of the trade-winds. As the heat of the earth's surface increases the rarity of the air above it, and causes the air at the top of the heated column to overflow, it would be expected that, during the year, the barometer would stand at a minimum in summer, and a maximum in winter. In reality, however, though the barometer is highest in mid-winter, there is another maximum in mid-summer, making thus two minima—one in spring, the other in autumn. This arises from the part borne by watery vapors in the pressure of the atmosphere. The heat of mid-summer introduces into the air a large quantity of moisture, in the form of elastic vapor, which, adding its pressure to that of the dry air, raises what would otherwise be the minimum barometric column to a higher point than that at which it stands in spring and autumn. Similar causes affect the pressure of the A. during the 24 hours of the day. There are two maxima—one at 10 A.M., the other between 10 and 11 P.M.; and two minima—at 4 A.M. and 4 P.M. Very slight variations indicate the existence of atmospheric tidal waves; but this subject is still obscure. The pressure of the A. exercises a most important influence on the organism of the human frame. A man of ordinary stature is exposed to a pressure of about 14 tons; but as the air permeates the whole body, and presses equally in all directions, no inconvenience is found to result from it. From experiments instituted by the brothers Weber in Germany, it has been ascertained that the heads of the thigh and arm bones are kept in their sockets by the pressure of the A.; and in balloon ascents the aeronaut often suffers from bleeding at the nose, lips, and even eyes—a fact that would seem to

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indicate that the strength of the blood-vessels has been adjusted with reference to atmospheric pressure.

Chemical Composition of the A.—Recent chemical researches give the following as the mean composition of 100 volumes and of 100 grains of dry air:

	Volumes.	Grains.
Nitrogen, ...	79·02	76·84
Oxygen, ...	20·94	23·10
Carbonic acid, ...	0·04	0·06
	100·00	100·00

Besides the substances just named, other gaseous matters occur (see ARGON) in quantities too small sensibly to increase the bulk of the A.; such as ammonia and ammoniacal salts, carburetted and sulphuretted hydrogen, carbonic oxide, sulphurous and sulphuric acid, nitric acid, and perhaps iodine, the quantity and even the presence of which are affected by local and meteorological causes. Roughly speaking, then, dry air may be said to consist of 4 volumes of nitrogen and 1 of oxygen, with a slight admixture of carbonic acid, and a mere trace of several other substances. As, however, the air of the A. is never found dry, we must add to the constituents already named watery vapor, the amount of which is constantly changing, according to locality, weather, wind, and temperature. It is stated that of 1,000 grains of atmospheric air, the proportion due to aqueous vapor varies from a minimum of 4 to a maximum of 16 grains. By far the most active chemical constituent of the A. is oxygen, essential to the existence of animal life, the maintenance of combustion, the rusting of metals, and the occurrence of many other chemical phenomena. A small portion of this oxygen occurs in the form of ozone (q.v.), a modification which, according to recent chemical discoveries, is important in the chemistry of the A. The nitrogen which forms the bulk of the A. has few chemical properties of importance, but performs the important part of diluting the oxygen, which, if it occurred alone, would act with too great intensity. The presence of carbonic acid in the air is shown by the production of the white carbonate of lime in lime-water freely exposed to its influence. Carbonic acid is produced in all processes where carbonaceous matter unites itself with the oxygen of the air, such as in animal respiration, in combustion, in fermentation, in putrefaction, and similar processes. The green leaves of plants, on the other hand, possess, in presence of sunshine, the power of decomposing carbonic acid into its elements, absorbing the carbon for their own tissues, and restoring the oxygen to the A. in its original purity. Between the processes above mentioned, on the one hand, and the action of plants on the other, the quantity of carbonic acid in the air is kept nearly constant. From the table it will be seen that 10,000 volumes of atmospheric air contain four volumes of carbonic acid. If it occurred in a much larger proportion, being poisonous, it would become dangerous to animal life; and if it occurred in a much less proportion, the vegetable world would lack

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its requisite nourishment. The other substances, of which traces are always or only sometimes found in atmospheric air, are difficult to detect in the air itself, but are generally found dissolved in rain-water, more especially in that which has fallen immediately after a long drought. Of these, by far the most important and widely diffused are ammonia and ammoniacal salts, which are of essential importance to the vegetable economy, because, dissolved in the rain, they furnish plants with the nitrogen required by them for the production of their flowers and fruit. Nitric acid is detected in the air after thunder-storms, sulphuretted hydrogen in the tainted air of sewers and such like places, and sulphurous and sulphuric acid only in the neighborhood of chemical or smelting works. A considerable quantity of carbonic oxide and carburetted hydrogen escapes unconsumed from our furnaces; and although the latter gas is in addition given off to the air in marshy and bituminous districts, the two occur in almost inappreciable quantity in the atmosphere.

In addition to its gaseous constituents, the A. contains solid substances in a state of exceedingly fine division, the presence of which is revealed in the sunbeam. Many of these minute particles, being the seeds or germs of plants and animals, must exert an important influence on the organic substances on which they may finally settle, inducing in many of them the conditions of disease or putrefaction.

When the composite nature of the A. was first discovered, it was supposed to be a chemical combination of nitrogen and oxygen, but further inquiries have rendered this opinion highly improbable. When any two bodies unite with each other chemically, the substance which results from their combination invariably possesses properties which the original constituents did not possess. Now the atmospheric union of oxygen and nitrogen is distinguished by no properties which may not be attributed individually to these gases. We have, then, in this respect, no indication that the atmospheric combination of oxygen and nitrogen is a chemical one. Again, when any composite gas is dissolved in water, the proportion of the ingredients dissolved in it is exactly the same as that in which they occur in the compound itself; but this is not the case with air dissolved in water, which is found to be richer in oxygen than atmospheric air. Now, as oxygen dissolves more readily in water than nitrogen, it is manifest that this larger proportion of oxygen arises from both gases acting independently of each other in respect to the water, a condition that would be impossible if they were in chemical union. From these and other corroborative facts, the A. is considered to be simply a mechanical combination of the gases contained in it. This, however, does not prevent the A. from having a uniform composition, as might at first sight be supposed; for when gases are mixed with each other, they intermingle thoroughly throughout the whole space occupied by them. Local causes may temporarily affect the relative proportion of the atmospheric ingredients, but the changes are so minute as to be detected by only the most delicate analysis.

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ATMOSPHER'IC ELECTRIC'ITY: opened to scientific investigation first by Benjamin Franklin. He demonstrated the identity of the lightning of the heavens with the electric spark. By his famous kite-experiment, he ascertained that the thunder cloud assumes an electrical condition precisely similar to that of the conductor of an electrical machine, and that the same mechanical and luminous effects are common, though in different degree, to both. The attention directed first by this discovery to the A. E., as displayed in the thunder-cloud, has since been extended to the electrical condition of the air in all the different states of the weather. It is now found that the air is sensibly electrical not only when the sky is overcast with thunder-clouds, but when the weather is clear, or when no thunder-clouds are present. Observations on A. E. are made by delicate electrometers connected with insulated rods at the top of the building, or other collecting apparatus. The following are some of the results got by continental observers: When the sky is clear and free from clouds, the A. E. is always positive, and an electroscope exposed to the action of the air is charged with positive electricity. On the other hand, the electricity of the ground is found to be negative. This was shown in a very ingenious way by Volta, who, by catching the fine spray of a fountain on the plate of a straw electroscope, found the straws to diverge with the negative electricity communicated to them by the water, which was necessarily of the same character as that of the ground. Because of this fact electroscopes, or the collecting apparatus connected with them, must not be overtopped by the neighboring trees or buildings, the negative electricity of which materially affects the indications given; and it is due to the same fact that no A. E. is discovered in the middle of a wood, or in a room, however high the ceiling. Under a clear sky, the potential of the A. E. is found to increase as we ascend, the lower aerial strata being less electrical than the higher. Becquerel proved this by a simple experiment on the plateau of Mount St. Bernard. On a piece of oiled silk he placed a silk thread, covered with tinsel, one end of which, terminated by a ring, was connected with the rod of a straw electroscope, and the other end was tied to an arrow armed with a metal point. When the arrow was shot horizontally, the straws showed no divergence; but when the arrow was shot upwards, they opened as it ascended, and diverged most when the arrow, in ascending, disengaged the ring from the rod of the electroscope. The same fact is shown in the following way: When a very delicate electroscope is adjusted for any particular position, it will, when elevated a few feet above that position, give indication of positive electricity, and when placed a few feet below, it will be charged negatively. In clear weather, likewise, the A. E. is found to be subject to certain daily periodical variations, and appears to have two maxima and two minima in the course of twenty-four hours. The first maximum takes place a short time after sunrise, and the second shortly after sunset; the first minimum shortly before sunrise, and the second in the afternoon, when the heat of the day is greatest. In cloudy

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weather the electroscope is affected sometimes positively, sometimes negatively, and is generally less influenced than in clear weather. The electricity of rain, snow, hail, etc., is sometimes positive, sometimes negative. In Stuttgart, for instance, it was found in the course of a year that the rain was 71 times positive to 69 times negative, and the snow 24 times positive to 6 times negative.

Sir William Thomson has made various observations on atmospheric electricity. His delicate electrometers give him not only great facility of observation, but their delicacy far transcends that of any instrument hitherto employed in such observations. Instruments such as his electrometers, that are sensitive to the electromotive force of a single Daniell's cell with any condensing contrivance, are a wonderful advance in observing power. Sir William's collecting apparatus is an insulated can of water placed inside a window, with a nozzle extending four feet and a half beyond the wall; the window being open only so far as to admit of the nozzle-tube passing without touching. The can, when the stop-cock is opened, assumes the potential of the air outside at the point where the jet breaks up into drops. In the portable electrometer for outside observations, he uses as the collector a burning match at the top of a long rod attached to the instrument. The collecting apparatus is, of course, insulated and connected with the electrometer. He estimates the amount of atmospheric electricity per foot or per inch. He calculates the difference of potential at the perpendicular distance, say, of a foot from any portion of the earth's surface, whether the level ground or an upright wall. He finds, as mentioned above, that the earth is always negative in clear weather, and the air positive, and that the difference of potential per foot is very different at different times. Thus, in the Isle of Arran, he found this to vary in ordinary fine weather from 22 to 44 Daniell's cells; with an e. or n.e. wind, the difference of potentials was from 6 to 10 times that per foot. He also finds sudden and unaccountable variations of potential within even comparatively few minutes, and he can suggest only that there may be cloudless yet cloud-like masses of clear air floating in the atmosphere, which are charged with electricity, and which in their passage over or near the electrometer give rise to these marked variations.

The cause of A. E. has given rise to much discussion. The electricity developed by evaporation and vegetation has been thought by some to account for the positive electricity of the air; but this view has been combated, and as yet no theory has been proposed, which satisfactorily accounts for it. For the electricity of the thunder-cloud, see LIGHTNING.

ATMOSPHER'IC RAIL'WAY: railway on which the locomotive-power is supplied by the pressure of the atmosphere more or less directly on the carriages themselves. Vallance patented a plan for conveyance of passengers along a railway within an air-tight tunnel exhausted in front of a carriage working as a piston, the pressure of the

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atmosphere acting on the carriage from behind. This plan was made public in 1825, and ultimately brought into experimental operation at Brighton, proving the possibility of such a mode of transit. The general opinion as to its merits was, that though it might succeed in the transmission of goods, or, with a smaller tube than the tunnel, might suit well the conveyance of the mails, it could not be expected to enjoy the favor of the travelling public, on account of its dark, close tunnel. Thus the subject of atmospheric railways had ceased to attract attention, when the curiosity of the public was again called to it, by the proposal of another plan of propulsion, by Henry Pinkus, an American gentleman, resident in England, who took out a patent for it about the year 1835, under the name of the Pneumatic railway. The apparatus for this was to consist of a cast-iron tube of about forty inches diameter, having a slit of about two inches wide on its upper side, the slit (which was covered by a flexible flap or valve) furnishing an opening through which the mechanism of a piston working within the tube might be connected with that of the leading carriage without.

Under improved arrangements of the details, Messrs. Clegg and Samuda made an experiment of this plan in 1840, on a part of the line of the West London railway; and so favorable was the issue, that the directors of the Dublin and Kingston railway adopted the atmospheric pressure system for a projected extension of their line from Kingstown to Dalkey. Accordingly, parliamentary sanction was obtained for the line, and the first A. R. was in full operation at the beginning of 1844. In that year the London and Croydon railway company began to lay down a line of A. R. along side of their locomotive line from London to Croydon. The South Devon railway company also adopted the atmospheric mode of working on a part of their railway. Both of these lines, however, were soon abandoned as unsatisfactory.

The result of these trials has clearly shown that the A. R. system cannot compete with the steam railway in ordinary travel. See PNEUMATIC DISPATCH.

ATOK, n. *ăt'ŏk* [S. Am. name]: variety of *Mephitis Americana*, found at Quito, whence Humboldt called it *Gulo Quitensis*. It is sometimes termed the Zorra.

ATOLL, n. *ăt'ŏl* [a Malayan word]: a coral island, consisting of a ring or circular belt, with a lagoon or lake in the centre. See CORAL ISLANDS.

ATOM, n. *ăt'ŏm* [L. *atŏmus:* Gr. *atŏmos*, indivisible—from Gr. *a*, not; *temno*, I cut]: a particle of matter that cannot be made smaller; anything extremely small; the smallest quantity of an element which can enter into combination—as distinguished from a *molecule*, consisting of two or more atoms. ATOMED, a. *ăt'ŏmd*, small as atoms. ATOMIC, a. *ă-tŏm'ĭk*, or ATOM'ICAL, a. *-ĭ-kăl*, relating to atoms; consisting of atoms. ATOM'IC HEAT, term introduced by M. Regnault. The atomic heat of the elements in a solid state is nearly a constant quantity, the mean value being 6·4. This number is obtained by multiplying

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the specific heat of an element by its atomic weight. The atomic heat of an element represents the quantity of heat which must be imparted to or removed from atomic proportions of the several elements, in order to produce equal variations in temperature. ATOM'ICALLY, ad. *-li*. ATOMIST, n. *ăt'ŏ-mĭst*, one who holds to the doctrine of atoms. ATOMIZE, v. *ăt'ŏ-mīz'*, to reduce to atoms. AT'OMIZER, n. an instrument used for reducing a liquid into spray, for disinfecting, cooling, perfuming, and similar purposes. AT'OMI'ZING, imp. ATOMIZED, pp. *ăt'ŏ-mīzd'*. AT'OMLESS, a. ATOMISM, n. *ăt'ŏ-mĭzm*, or ATOM'ICISM, the doctrine of atoms. ATOMICITY, n. *ăt'ŏm-ĭs'ĭ-tĭ*, the power with which the atoms of one body can combine with the atoms of another. AT'OMICITIES, plu. *-i-tiz*. ATOM'IC THE'ORY, in *chem.*, the supposed resolution of bodies into ultimate particles or atoms, and the relative proportions in which they combine to form compound substances. ATOMY, n. *ăt'ŏ-mĭ*, an atom; an abbreviation for 'anatomy.'

AT'OM: an indivisible particle. In ancient philosophy, two theories of the nature of matter were recognized, and these have continued to form subjects of argument among speculative men since B.C. 510. One theory is, that matter is infinitely divisible. Thus, a needle may be divided into two, and each of the parts may in its turn be broken or cut into two, and each of the latter again and again be subdivided, till the parts become so small that it may be impossible to see them by the naked eye; but these parts are regarded as capable of still further division, without limit or stoppage, provided more perfect or delicate means could be employed to act upon them. The second theory regarding the constitution of matter is, that in the repeated division and subdivision of a solid, liquid, or gas, a point will be reached at length when it will no longer be possible, by any conceivable means, to break a molecule in two, the molecule being a real unity, not composed of separable parts —in other words, an *atom*. The latter theory recognizes the finite divisibility of matter, and considers that all matter is more or less compactly built up of myriads of atoms aggregated together, and having spaces or pores between the several atoms or particles. If it were possible to subject such matter to the scrutiny of a sufficiently powerful magnifying-glass, or microscope, and thus exhibit or behold the atoms so separated by spaces, then an appearance would be presented similar to that which the painter chooses to depict on the canvas when he is representing a snow-storm, and where every little flake of snow is separated from its neighbor one by a space in which there are none; or that which would be observed if, during a hailstorm, some great power were to cry, 'Halt!' and that instant every minute hailstone was arrested in the spot it had reached.

This view of the physical nature of matter, known as the *atomic* or *corpuscular theory*, has in modern times received some support from the facts embodied in the chemical atomic theory originated by Dalton. Granting, however, that the chemist can prove that his simple and compound forms of matter are built up of chemical atoms, the prob-

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lem still remains to be solved as to the possible identity of physical and chemical atoms. What the chemist regards as an A. in his science, may not be an ultimate and indivisible A. in a physical point of view; the chemical A., though incapable of division as a chemical A., may still be composed or built up of many physical atoms, and may be capable of being subdivided into such. Indeed, while the atomic theory of Dalton, when first announced, was eagerly seized upon as the best possible evidence for the existence of both chemical and physical atoms, the tendency of recent researches and discussions in chemistry has been to show that the chemical A. is different from the physical, and does not necessitate the existence of the latter. See ATOMIC THEORY. According to the ordinary acceptation of the term, the chemical A. is a molecule of matter having a definite weight, magnitude, and form, possibly alike for the atoms of the same material, but differing in those of different substances. The form of an A. is supposed by some men of science to be the same as that which the fragments of a substance assume when it is split in the direction of the planes of the cleavage of its crystals (see CRYSTALLOGRAPHY); but a more general belief has been, that all atoms are spherical, and that the various crystalline forms are produced by the manner in which the atoms are grouped together. In regard to the size of atoms, Sir William Thomson has shown, by three entirely different trains of argument from observed facts, that the diameter of an A. cannot be greater than $\frac{1}{50000000}$, nor less than $\frac{1}{5000000000}$ of an inch. See MATTER: VORTEX.

ATOMIC THEORY, in Chem: a theory as to the ultimate constitution of material bodies. Analysis shows that compound bodies contain certain elements (see CHEMISTRY) in certain proportions. These proportions have been minutely examined by chemists since the time when the balance was first applied to chemical investigation, and it has been proved that the respective quantities of each of the combining elements are not dependent entirely upon external conditions, but are regulated by certain laws. These laws were partially observed and discussed by earlier chemists and physicists, but it was reserved for Dalton (q.v.), systematizing the somewhat incoherent labors of his predecessors, to announce, in positive language, the four laws which regulate the union of various kinds of substances, and which are still acknowledged by chemists as the LAWS OF COMBINING PROPORTION, or the Atomic Theory. These laws regulate the combination of unlike substances by *weight*, and not by *volume;* and they are based upon the preliminary acknowledged fact, capable of experimental demonstration, that the same compound substance is always composed of the same ingredients or elements.

The *first law* of combination by weight comprehended under the A. T. is THE LAW OF CONSTANT PROPORTION, which teaches that the elements or ingredients which form a chemical compound are always united in it in the same proportion by weight. Thus, water, which consists of oxygen and hydrogen, does not contain one or both of these

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elements in indefinite amount, but it is invariably made up of 8 parts by weight of oxygen to 1 part by weight of hydrogen. It makes no difference whether the total amount of either element be represented by grains, ounces, pounds, or tons, it will always be found that the proportion of 8 parts of oxygen to 1 part of hydrogen is kept up. Neither does the source of the water make any difference, for pure water obtained from rain, snow, or hail, the river or the sea, the sap of plants or the juices of animals, invariably contains the same elements in the same proportions. Again, common salt (chloride of sodium), whether it be obtained from sea-water, salt-springs, rock-salt, or even the blood of animals, always consists of chlorine and sodium in the exact and never-varying proportion of 35½ parts of chlorine to 23 parts of sodium. While the law of constant proportion teaches that the same compound is always built up of the same ingredients in the same proportion, it does not necessarily follow that the same elements or components in the same proportions will invariably form the same compound body. It is far otherwise; and many examples can be obtained, especially from organic chemistry, where the same components in the same proportions produce very different substances. Thus, starch and cotton (lignine)—very dissimilar substances—consist of carbon, hydrogen, and oxygen in the very same proportions; and gum-arabic and cane sugar are similarly circumstanced. See ISOMERIC BODIES.

The *second law* is the LAW OF RECIPROCAL PROPORTION, which teaches that the proportions in which two substances unite with a third have a simple arithmetical relation to that proportion in which they unite with each other. Thus oxygen and hydrogen unite in the proportion of 8 to 1 to form water. Carbon and hydrogen are present in olefiant gas in the proportion of 6 to 1, and oxygen and carbon unite in the proportion of 8 to 6 to form carbonic oxide. Again we have a compound of oxygen and iron containing these elements in the proportion of 8 to 28; we have also a compound of sulphur and iron in the proportion of 16 to 28; and sulphur and oxygen unite together to form sulphurous acid gas, which contains equal weights of the two elements—the proportion of 1 to 1 having a simple arithmetical relation to the proportion 8 to 16.

Numbers representing the proportions in which the elements combine (such as 1 for hydrogen, 8 for oxygen, 6 for carbon, 16 for sulphur, 28 for iron, etc.), are called their 'combining proportions,' or *Atomic Weights* (q.v.). It is obvious that analysis alone cannot enable us to fix definitely such numbers. There is nothing in the *composition* of their compounds to lead us to adopt the proportional numbers given above for hydrogen, oxygen, carbon, sulphur, and iron, rather than simple multiples or submultiples of them. In fact, the numbers adopted by Berzelius, and now reintroduced, are in the proportion—hydrogen 1, oxygen 16, carbon 12, sulphur 32, iron 56. For the reasons for preferring certain particular numbers to any multiples or submultiple of them, see CHEMISTRY.

The *third law* is THE LAW OF MULTIPLE PROPORTION,

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which is, that when one substance combines with another in several proportions, the higher proportions are multiples of the first or lowest. Thus, hydrogen unites with oxygen in two proportions; as 1 of hydrogen to 8 of oxygen, when ordinary pure water is the result of union; and as 1 of hydrogen to 16 of oxygen, when peroxide of hydrogen, a powerful bleaching agent, is produced—the difference in the respective amounts of the oxygen—8 and 16—being, that the latter is a multiple of the former by 2. Again, carbon unites with oxygen in two proportions: as 6 of carbon to 8 of oxygen, when the inflammable gas, carbonic oxide, is formed; and as 6 of carbon to 16 of oxygen, when the non-inflammable gas, carbonic acid, is the result. The variation in this instance is, that the oxygen is present in the one case as 8, and in the other as a multiple of that number by 2, viz. 16. One of the best illustrations of this law is in the union of nitrogen and oxygen: 14 parts of nitrogen can unite with 8 of oxygen, and thus form laughing-gas; but the same amount of nitrogen can combine with 16, 24, 32, or 40 of oxygen—in the latter case constituting anhydrous nitric acid—all of the higher numbers being multiples of the first or lowest, viz. 8 by 2, 3, 4, and 5.

The *fourth law* is THE LAW OF COMPOUND PROPORTION, which teaches that the combining proportion of a compound substance is the sum of the combining proportions of its components. Thus, the compound body, carbonic acid, which consists of 6 of carbon united with 16 of oxygen, has the combining proportion 22, which is the sum of the combining proportions of the carbon and oxygen composing it, viz. $6 + 16 = 22$. Similarly, the compound substance lime contains 20 of the metal calcium combined with 8 of oxygen, and has the combining proportion of $20 + 8$ or 28. When carbonic acid and lime are linked together, as in marble, which is the carbonate of lime, then they are united in the proportion of 22 parts of carbonic acid and 28 of lime. Not only is 22 the proportion in which carbonic acid will combine with lime, but it is the proportion in which it will form compounds with every other substance of similar chemical constitution.

The preceding laws regulating the union of substances by weight have been obtained by comparing together the results of numerous experiments, and every careful analysis serves to confirm their accuracy. But Dalton's theory was not limited to the statement of these laws; it was also an attempt to explain them. It assumes that each elementary substance consists of extremely small indivisible particles or atoms; that the atoms of any one element are all exactly alike, but differ from the atoms of every other element. Among other points of difference, they differ in weight, and although the absolute weight of an atom is unknown, the weights of two atoms, one of one element, the other of another element, are in the proportion of the combining weights of the elements they belong to. Thus the combining weight of sulphur is twice that of oxygen: the absolute weight of an atom of either is not known; but the A. T. assumes that each atom of sulphur is twice as heavy

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as an atom of oxygen. Further, Dalton's theory assumes that the ultimate particles of compound bodies contain a comparatively small number of atoms of the component elements. It is easy to see how this theory explains the laws enunciated above. It must, however, be remembered that while the theory satisfactorily explains the laws, the laws do not prove the theory. It is quite conceivable that such laws might exist, although matter did not consist of atoms. The A. T., however, rests not only on a chemical, but also upon a physical, foundation. According to the modern molecular theory, matter consists of small particles, each of which is in motion, and this motion is the more rapid the hotter the substance is. These small particles or 'molecules' cannot be broken up without changing the character and properties of the substance. They are not, however, *atoms*. In the case of compounds, as the molecules of any *one* substance are all similar to one another, each molecule must contain all the components; and in many elementary substances it can be proved, assuming the truth of the molecular theory, that each molecule consists of several similar atoms. A molecule, then, is either a single atom, as in *some* elementary substances, or a group of atoms which remain together during those movements which depend on the temperature of the substance. Now, the velocity of these motions increases as the temperature is raised; when, therefore, the temperature is raised so high, and the velocity of the molecules becomes so great that the collision of the molecules with one another is sufficiently violent to break them up and separate their constituent atoms, the substance is decomposed, the atoms rearranging themselves into new groups (or molecules) capable of remaining unbroken under the new conditions. This explains the decomposition of compounds by the action of heat.

When the temperature is not so high, and the violence of collision insufficient to break up the molecules, these are merely shaken, thrown into a state of vibration, and thus the hold of the atoms upon each other is loosened. Now, if two substances are mixed together, it may happen that some atoms in the one set of molecules are so attracted by some atoms in the other set, that, when a molecule of the one set meets one of the other set in a vibrating or loosened condition, an exchange of atoms may take place between them, or each may lose a part of its atoms, these going to form a new molecule. This gives an explanation of the action of one substance upon another, and further shows why, in general, a certain temperature is required in order that the action may take place.

Gay Lussac first pointed out that a relation exists between the density of a gas and its atomic weight. Avogadro greatly simplified the statement of these relations by announcing the law of molecular volumes of gases, a law which Prof. Clerk Maxwell has since proved to be a necessary consequence of the molecular theory of gases. This law is, that a given volume of gas at a given temperature and pressure contains the same number of molecules whatever be the nature of the gas.

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From this law, to which may be given the name of 'Avogadro's law,' and from Boyle's law, and the law (often called Charles's law) that the volume of a gas is directly proportional to the absolute temperature—that is, to its temperature reckoned from a point 273° centigrade below the freezing-point of water—it follows that the volume occupied by a given mass of a gas is a function of the pressure, the temperature, and the molecular weight of the gas; understanding by the 'molecular weight' of a substance a number M, such that M : 2 : : the absolute weight of a molecule of the substance : the absolute weight of a molecule of hydrogen. The number 2 appears in this proportion because we assume the *atom* of hydrogen as our unit both of atomic and of molecular weight, and it can be proved (see CHEMISTRY) that the molecule of hydrogen gas consists of two atoms. If, then, P be the pressure in millimetres of mercury at 0° C; t, the temperature of the gas, as indicated by a centigrade thermometer; M, the molecular weight of the substance; and V. the volume (in cubic centimetres) occupied by a gramme of the gas, $V = \frac{760}{P} \times \frac{t \times 273}{273} \times \frac{22400}{M}$. In the gaseous state, the average distance between the molecules, although extremely small, is great compared with the size of the molecules, so that the volume of the gas depends almost exclusively upon the distance between the molecules; it is not so in the case of solids and liquids, in which the molecules are so closely packed as to be almost always in contact. The volume occupied by solids and liquids depends, therefore, far more upon the *atoms* of which the substance is made up, than upon its *molecular* structure. For further recent modifications of the A. T., see MATTER; CHEMISTRY.

ATOM'IC VOLUMES: see ATOMIC THEORY: CHEMISTRY.

ATOM'IC WEIGHTS: the proportions by weight in which the various elementary substances unite together. It is necessary that one element be selected as the starting-point of the series, and an arbitrary sum affixed to it, and thereafter all the other elements can have their sums awarded to them, according to the proportional amounts in which they combine with each other. The *second law*, mentioned under the ATOMIC THEORY (q.v.), explains the manner in which this can be done, and how far the numbers are arbitrary. In all systems of atomic weights in modern use, the atomic weight of hydrogen is taken as unity, and the atomic weights of the other elements are then fixed, so as to give on the whole the simplest and most consistent formulæ for their compounds.

There are two systems of atomic weights at present in use: First, The 'old' system, which, after much discussion, was generally adopted about 1845; and, second, the new system, which is, in many respects, a revival of the system of Berzelius, and came into general use by scientific chemists about 1860. For the reasons for the change of atomic weights, see CHEMISTRY: also ELEMENTS, CHEMICAL.

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ATOMIC WEIGHTS.

ELEMENTARY SUBSTANCES, WITH THEIR SYMBOLS AND ATOMIC WEIGHTS.

Name of Element.	Symbol.	Atomic Weights.	
		Old.	New.
Aluminium	Al	13·7	27·4
Antimony (Stibium)	Sb	122·0	122·0
Arsenic	As	75·0	75·0
Barium	Ba	68·5	137·0
Bismuth	Bi	208·0	208·0
Boron	B	11·0	11·0
Bromine	Br	80·0	80·0
Cadmium	Cd	56·0	112·0
Cæsium	Cs	133·0	133·0
Calcium	Ca	20·0	40·0
Carbon	C	6·0	12·0
Cerium	Ce	46·0	92·0
Chlorine	Cl	35·5	35·5
Chromium	Cr	26·0	52·0
Cobalt	Co	29·5	59·0
Copper (Cuprum)	Cu	31·7	63·4
Didymium	Di	47·5	95·0
Erbium	Er	56·3	112·6
Fluorine	F	19·0	19·0
Gallium	Ga	....	68·0
Glucinum (Beryllium)	G	4·7	9·4
Gold (Aurum)	Au	196·0	196·0
Hydrogen	H	1·0	1·0
Indium	In	37·8	113·0
Iodine	I	127·0	127·0
Iridium	Ir	99·0	198·0
Iron	Fe	28·0	56·0
Lanthanum	La	46·0	92·0
Lead (Plumbum)	Pb	103·5	207·0
Lithium	Li	7·0	7·0
Magnesium	Mg	12·0	24·0
Manganese	Mn	27·5	55·0
Mercury (Hydrargyrum)	Hg	100·0	200·0
Molybdenum	Mo	48·0	96·0
Nickel	Ni	29·5	59·0
Niobium	Nb	94·0	94·0
Nitrogen	N	14·0	14·0
Osmium	Os	100·0	200·0
Oxygen	O	8·0	16·0
Palladium	Pd	53·0	106·0
Phosphorus	P	31·0	31·0
Platinum	Pt	99·0	198·0
Potassium (Kalium)	K	39·0	39·0
Rhodium	Rh	52·0	104·0
Rubidium	Rb	85·4	85·4
Ruthenium	Ru	52·0	104·0
Selenium	Se	39·5	79·0
Silicon	Si	14·0	28·0
Silver (Argentum)	Ag	108·0	108·0
Sodium (Natrium)	Na	23·0	23·0
Strontium	Sr	43·8	87·6
Sulphur	S	16·0	32·0
Tantalum	Ta	182·0	182·0
Tellurium	Te	64·0	128·0
Thallium	Tl	204·0	204·0
Thorium	Th	57·8	115·6
Tin (Stannum)	Sn	59·0	118·0
Titanium	Ti	25·0	50·0
Tungsten (Wolfram)	W	92·0	184·0
Uranium	U	60·0	120·0
Vanadium	V	51·3	51·3
Yttrium	Y	30·8	61·6
Zinc	Zn	32·5	65·0
Zirconium	Zr	44·8	89·6

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ATONE, v. *ă tōn'* [from *at one*, denoting to be, or to cause to be, at one]: to turn again from the wrong to the right; to agree; to make amends; to give satisfaction for an offense or a crime; to expiate by sacrifice; to reconcile; to appease. ATON'ING, imp: ADJ. making amends or satisfaction. ATONED, pp. *ă-tōnd'*. ATONEMENT, n. *ă-tōn'-mĕnt*, reconciliation after enmity; satisfaction; expiation; an expiatory sacrifice. ATON'ER, n. one who.

ATONE'MENT, in Theol.: the reconciliation of man with God. Sin violates the ground of union which the personal creature has, by nature, with the holy God. The act of sin is one of separation; the act begets the state of sin, the state confirms and repeats the act. The doctrine of the A. treats of the mediation necessary for restoring the union between God and man, which has been lost by sin. The A., therefore, must ever be the fundamental doctrine in every religion of sinful creatures. In the Christian religion, it manifestly occupies this central position; for the Christian doctrine of the A. is but the explanation of its great historic fact—the embodiment in one person of the divine and human natures in perfect agreement. In the person of Christ, God and man are atoned or made to be *at one:* Christ is their Atonement.

So fundamental is the doctrine of the atonement in the Christian religion, that it does not, like many other doctrines, form a ground of distinction among the great bodies into which the Christian world has been divided. All historic churches may be said to be equally orthodox on this point. The Church of Rome, the Greek Church, the various Protestant churches with the exception of some temporary and unimportant sects, with doctrines scarcely recognizable as within the bounds of Christianity—all agree, taking their standards as a criterion, in resting the sinner's hope of salvation on the mediatorial work or atonement of Jesus Christ. Nevertheless, there have been from the beginning of speculative Christian theology, and continue within the several churches, various ways of conceiving and explaining the exact nature and mode of operation of this mediatorial work. What follows is a brief sketch of the historical development of these speculations.

Christianity differs from heathenism in the clear perception which it has of the antagonism that sin has introduced between God and man. Heathenism but vaguely conceives of this variance, and consequently has but an ill-defined notion of the atonement required, the notice seldom containing more than the idea of a reconciled union of the individual man with nature and the universal life. Even where its mythical divinities assume personality, it is but an ideal personality without any concrete reality of life, and consequently without any real significance for the conscience. In this state the abject subjection of man to outward nature, or to the visible system of things, prevents his rising into that sphere of conscious freedom which shows sin sinful, and demands an A. with one who is Lord both of nature and man.

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In Judaism, man stands above outward nature, in conscious relation to a personal God, whose written law exhibits the requirements of his relationship with man—requirements which are never met, and which only make him fearfully conscious of the ever-widening breach between him and his God. Thus the law awakened the sense of guilt, and the desire for an A.; a desire that it could never satisfy. The never-ceasing demands of these ever-unfulfilled requirements were constantly acknowledged by its whole sacrificial *cultus*, which expressed the hidden ground of Jewish hope, and prophetically pointed to its future manifestation.

But though the Holy Scriptures, throughout the Old Testament, exhibit the making of an A. by vicarious sacrifice (Lev. xvi. 21; xvii. 11); and though the idea, both of the suffering and the deliverance of many by the sins and virtues of one, was common to all antiquity, the idea of the suffering and vicarious Messiah, plainly declared in the writings of the prophets (Luke, xxiv. 46; Isaiah, liii.; Psalm xxii.), and not entirely hidden from the more thoughtful and devout contemporaries of Jesus (Luke, ii. 34; John, i. 29), was foreign to the Messianic faith of the great body of the people.

In the New Testament, Christ is everywhere exhibited as one sent from God for the salvation of the world (John, iii. 16, 17); and as the condition, on the part of man, of his obtaining this salvation, we read of the requirement of repentance, faith, and reformation (Matt. iv. 17; v. 3, 11; vi. 12; Mark, xvi. 16; Luke, xv. 11), while, on the part of God, as conditioning and mediating his forgiveness of sins, we have exhibited the entire life of Christ upon earth conceived of as embracing severally its individual features (Acts, v. 31; Rom. iv. 25; viii. 34); but more especially his death as a ransom for our sins (Matt. xx. 28; xxvi. 28), as a vicarious sacrifice (1 Peter, i. 19; 2 Cor. v. 21), by which we are redeemed from the bondage of sin (1 Tim. ii. 6; Gal. iii. 13; 2 Peter, ii. 1), and obtain forgiveness (Rom. v. 19; 1 Cor. xv. 3; 1 John, i. 7), and eternal life and peace with God (John, x. 11; Col. i. 20). Christ is therefore the Mediator between God and man (1 Tim. ii. 5), having made peace through the blood of his cross (Col. i. 20); the propitiation for our sins (1 John, ii. 2; iv. 10); and our high-priest who offers himself a sacrifice to reconcile us with God (Heb. ii. 17; v. 1; ix. 28). Moreover, we are also taught that God has in Christ reconciled the world with himself (Rom. v. 10; Col. i. 22; 2 Cor. v. 19).

In accordance with this full and explicit teaching of Holy Scripture, we find that the sufferings and death of Christ were ever regarded as of primary and essential importance in his work of redemption; notwithstanding, we look in vain through the early centuries of the Christian Church for anything like a systematic development of the doctrine of the Atonement. The germs of the doctrine existed, but without any logical connection or clearness. It was the *fact* of the A. in Christ that was made prominent and

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central. 'On this head there has been a twofold mistake —sometimes the existing beginnings of many later elaborated dogmas have been overlooked; or, on the other hand, it has been attempted to point out with literal distinctness church doctrines as if already developed.' The early church fathers dwell with a sort of inspired devotion upon those facts of the gospel which represent Christ as the sacrifice for our sins, as the ransom paid for our redemption, as our deliverer from the power of Satan, as the restorer to mankind of whatever was lost by the fall of Adam; but they seldom attempt to show *how* these blessed results connect themselves with the sufferings and death of Christ; neither do they show in what manner the A. has objectively been made, nor how it is brought to the experience of its individual subjects.

In many ways the sufferings and death of Christ were regarded in relation to their A. for sin. During the first four centuries there appeared no certainty of opinion as to whether they were a ransom price paid to God or to the devil. The latter supposition was the more prevalent, shared by Origen and St. Augustine. Gregory of Nyssa explains this opinion by saying that the devil consented to receive Jesus as a ransom, because he regarded him as more than an equivalent for all those under his power; but that, notwithstanding his subtilty, he was outwitted, for, owing to the humiliation in which Christ was veiled, he did not fully recognize him as the Son of God, and consequently was himself deceived. But having consented to receive him as a ransom for mankind, he was righteously deprived of his dominion over man, while he could not retain Jesus when he discovered him to be the Holy One of God, being horrified and tormented by his holiness.

Athanasius first of all successfully controverted this notion, and maintained that the ransom was paid to God. He argued that as God had threatened to punish transgressors with death, he could but execute his threat. But then it was not becoming the character of God to allow his purpose in the creation of man to be frustrated by an imposition practiced upon him by the devil. The only expedient, therefore, which remained for his deliverance from death was the incarnation and sacrifice of the Logos in his stead, by which the justice and veracity of God would be maintained, man delivered, the law fulfilled, and the power of the devil broken. It has often been stated that Tertullian uses the term satisfaction with respect to Christ's A. for sin, but this is incorrect, for although he employs the term, he never does so in the sense of a vicarious satisfaction, but only in the sense of making amends for our own sins by confession and repentance.

These elemental and mythical conceptions of the doctrine of the A. remained in a most imperfect and altogether undeveloped condition, until the acute and subtle genius of the Piedmontese Abp. of Canterbury reduced them to order, and presented them in logical consistency. Anselm, therefore, must be regarded as the author, at least as to its form, of the doctrine of vicarious satisfaction.

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which, under various modifications, has ever since continued as the 'orthodox' doctrine of the church. The following is, in all essential respects, his statement of the doctrine: The infinite guilt which man had contracted by the dishonor of his sin against the infinitely great God, could be atoned for by no mere creature; only the God-man, Christ Jesus, could render to God the infinite satisfaction required. God only can satisfy himself. The human nature of Christ enables him to incur, the infinity of his divine nature to pay, this debt. But it was incumbent upon Christ as a man to order his life according to the law of God; the obedience of his life, therefore, was not able to render satisfaction for our guilt. But although he was under obligation to live in obedience to the law, as the Holy One he was under no obligation *to die*. Seeing, then, that he nevertheless voluntarily surrendered his infinitely precious life to the honor of God, a recompense from God became his due, and his recompense consists in the forgiveness of the sins of his brethren, the race of man.—In this form of the doctrine we are taught the necessity of an active vicarious satisfaction; but Anselm nowhere teaches the passive satisfaction, he nowhere says that Christ endured the punishment of men. Nor do we find in his writings the development of the subjective side of the doctrine—namely, how the satisfaction rendered to God mediates the A. in the experience of the believer.

After the time of Anselm, and before the Reformation, two views of the A. divided the opinions of the church: one regarding the peculiar manner in which it was accomplished as absolutely necessary, and deriving its efficiency from its objective nature; the other supposing a subjective connection between the sufferings of Jesus and the price of redemption, because this was best fitted to effect the moral transformation of men. According to Anselm, the satisfaction rendered by Christ was greater than the guilt for which he atoned; and it needed to be greater, for the payment of the debt due to God gave men no claim to the favor of God. Thomas Aquinas and his followers maintained Augustine's opinion of the infinite value of the blood of Christ rendering it more than sufficient; while the Scotists maintained that it was sufficient only because God was pleased to regard it as sufficient. But in the period between Anselm and the Reformation, little or no progress was made in the development of this doctrine.

We come now to the period of the Reformation, when the objective speculations of the schoolmen are brought under the subjective requirements of human souls, and the doctrine of the A. is viewed in this light. In the writings of Luther, one will only with difficulty arrive at his intellectual apprehension of this doctrine in its scientific form; but setting out with the consciousness of sin, one will everywhere discover his firm conviction that in Christ all sin is 'vanquished, killed, and buried, and righteousness remaineth a conqueror and reigneth for ever.' The following is an outline of the Lutheran doctrine, as laid down in the *Con-*

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cordienformel: It is only by faith that we can receive the blessings presented to us in the gospel by the Holy Ghost. Faith justifies, because it appropriates the merit of Christ. Therefore, the righteousness which is imputed to the believer, simply by the grace of God, is the obedience, the suffering, and the resurrection of Christ, by which he has satisfied the claims of the law, and atoned for our sins. For as Christ is not merely man, but God and man in one person, he was, as Lord of the law, no more subject to it than he was subject to suffering and death. For this reason, his two-fold obedience—that which he rendered, on the one hand, by his suffering and death, and, on the other, by his righteous fulfilment of the law on our behalf—is imputed to us, and God acquits us of our sins, and regards us as just, in view of his complete obedience in what he did and suffered. This obedience embraces the entire existence of Christ upon earth, and is so complete that it fully covers the disobedience of men, so that their disobedience is not reckoned against them for condemnation. Therefore, Christ is our righteousness only so far as in his entire person the most perfect obedience is exhibited, which he was able to render in that he was neither God alone nor man alone, but both in one, God and man.

According to Calvin: if one asks how Christ has reconciled us with God, and purchased a righteousness which made him favorable to us, it may be answered generally, that Christ accomplished this by the whole course of his obedience. But although the life of Christ is to be regarded as paying the price necessary for our deliverance, the Scriptures ascribe our redemption especially to his death. Calvin attached great importance to the particular mode of his death—any other mode of death would not have rendered the same satisfaction to God. He, however, says little or nothing about Christ's fulfilling the law for us, but dwells upon his delivering us from its curse. He does not, therefore, exhibit his active obedience separated, as an essential part of his satisfaction for sin, from his passive obedience. The importance attached to the obedience of his life arises from its natural and necessary connection with his suffering and death. And the great importance attached to his death is drawn rather from the view of its subjective necessity, than from the idea of the divine righteousness—namely, that without such a death there would have been no sufficient ground for the subjective realization of deliverance from sin and guilt. Calvin's view differs from that of the Lutheran *Concordienformel* in that he does not regard the relationship of God to man merely from the standpoint of punitive and satisfying righteousness, which always leads to the merely negative notion of a Redeemer from guilt and punishment, but looks upon Christ as the highest Mediator, through whom the nature of God is communicated to man. There was a necessity for Christ's incarnation, not merely because, apart from the suffering of the God-man, the divine righteousness could not be atoned, but also because, without such a divine Mediator, there could be no vital relation between

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God and man. 'Had man remained free from all taint, he was of too humble a condition to penetrate to God without a Mediator.'

While the reformers established the doctrine of the A. on the theory of Anselm, and extended it so as to make the sufferings of Christ include the divine curse, and introduced distinctions between Christ's active and passive obedience, Socinus endeavored to prove the falseness of Anselm's theory. He shared with the Protestants the subjective principle, which the period of the Reformation established, but developed it in a one-sided manner. Socinianism represents man as attaining to oneness with himself and with God by his own moral energy. It rejects that idea of the righteousness of God which makes it impossible for him to forgive sin without a satisfaction, as imposing finite limitations upon the divine Being; and also objects to the doctrine of satisfaction, on the ground that satisfaction for sin and forgiveness of sin are incompatible with each other; and, moreover, objects that sin and punishment are of so personal a nature as not to allow of their being transferred. It further opposes the doctrine of the active and passive obedience of Christ, on the ground that the one excluded the other. Another objection maintained the actual impossibility of Christ's rendering the supposed satisfaction for sin.

The doctrine which it sought to establish in the place of the one it attempted to overthrow may in brief be stated as follows: Man is reconciled to God by repentance and reformation. Only from an act of man changing his disposition, and not from an act of God changing his relation to man, follows his reconciliation with God. God is in himself ever the same towards man—reconciled from all eternity; man alone has to assume a new relation; as soon as he does this, he is immediately reconciled; by this act of his will, he is at one with God. Only in man's moral state is there any obstacle to his reconciliation. This greatest and holiest accomplishment, the reconciliation of man with God, is achieved by an act of his will.

In this purely subjective theory, repentance occupies the place of faith in the orthodox doctrine, and faith becomes identical with obedience; for repentance and reformation are regarded as but the two sides of the same act of the will. It follows from this that justification is of works as well as reconciliation. A necessity for the sufferings of Christ is shown for the following objects—that he might become our example; better fitted to render us help; that we might have a pledge and guarantee of the divine forgiveness; and as conditioning his resurrection and ascension to glory.

We must now hasten to the form of this doctrine among 'Modern Calvinists,' without attempting further to exhibit the links in the chain of its historic connection. 'Modern Calvinism' represents the A. as that satisfaction for sin which was rendered to God, in his public character as moral governor of the world, by the perfect obedience unto death of our Lord Jesus Christ. The nature of this satisfaction

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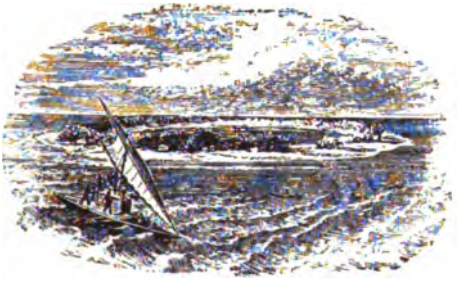
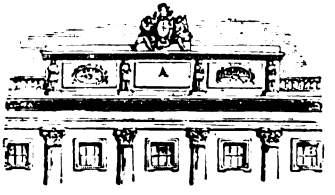


Atoll.

Atrium of the House of Pansa in Pompeii (restored).

Atropal Ovule.



A, **Attic** of Somerset House, London.

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was a moral, not a pecuniary satisfaction. It preserves to the moral government of God its authority, while its tendency is to procure the forgiveness of sin. The value of the sufferings of Christ consists in their tendency to uphold the divine moral government unimpaired while pardon is extended to those who have violated it, rather than in the intrinsic excellence of those sufferings, which, though essential to, did not constitute their value. There was a moral necessity for Christ's sufferings and death—obstacles to the bestowment of pardon had to be removed—the influence of the Holy Spirit had to be secured. The whole contents of Christ's earthly existence, embracing both his active and passive obedience—a distinction unsupported by the word of God—must be regarded as contributing to the A. which he made. Of the actual sufferings of Christ immediately attending his death, it is not allowable to speak with confidence, so little has been revealed. It may, however, be considered—whether the Saviour's deprivation of his Father's countenance may not have been indirectly caused rather by his awful and afflicting sense of the evil of sin, than otherwise.—As to the 'extent' of the A., there is a broad distinction to be made between the *sufficiency* of the A., and its *efficiency*. It may be true that Jehovah did not intend to exercise upon all men that influence of the Holy Spirit which is necessary to secure the salvation of any one, but as the A. was to become the basis of moral government, it was necessary that it should be one of infinite worth, and so in itself adequate to the salvation of all. The body called Universalists (q.v.) hold both the efficiency and ultimate sufficiency of this great event in history.

The foregoing represents the modified view of the doctrine as advocated by Dr. Payne, and as held, in all essential respects, by such men as Pye Smith and Wardlaw, which, in its earlier form, and as found in the writings of Owen and Edwards, maintains that the A. was made only for the elect; and that its necessity with respect to them arose out of the eternal justice of God, which required that every individual should receive his due desert; and, consequently, that the sufferings of Christ were the endurance of punishment equivalent in amount or value of suffering, if not identical in nature—as Owen maintains—with that to which the elect were exposed; and, moreover, that the meritorious obedience of Christ in fulfilling the law imputes a righteousness to those for whom the A. secures salvation, which gives them a claim to the reward of righteousness.

The doctrine of the A. has taken various forms in the philosophic theology of Germany from Kant to the present time. See NEANDER. Passing by these, we may attend to some leading forms of the doctrine advocated during recent years, which may fairly represent present opinion.

Let us begin with the view of modern Unitarianism, which may very clearly and fairly be presented in the words of one of the most able of its advocates, the Rev. Prof. John James Tayler: '"There is *one* mediator between

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God and men, the man Christ Jesus." This can only refer to unrivalled pre-eminence, not to exclusive function. For all higher minds do, in fact, mediate between their less gifted fellow-creatures and the great realities of the invisible world. This "*one*" is a *human* mediator, "the man Christ Jesus"—not a being from another sphere, an angel or a God—but a brother from the bosom of our own human family. "He gave himself a ransom for *all*" who embrace his offers and will hearken to his voice. He brings from God a general summons to repent; and with that he conveys, through faith, a spiritual power to shake off the bondage of sin, and put on the freedom of a new heart and a new life. He is a deliverer from the power of sin and the fear of death. This is the *end* of his mediation. This is the redemption of which he paid the price. His death, cheerfully met in the inevitable sequence of faithful duty, was only one among many links in the chain of instrumentalities by which that deliverance was effected. It was a proof such as could be given in no other way, of trust in God and immortality, of fidelity to duty, and of love for mankind. In those who earnestly contemplated it, and saw all that it implied, it awoke a tender response of gratitude and confidence, which softend the obdurate heart, and opened it to serious impressions and the quickening influences of a religious spirit.'

Prof. Jowett advocates an opinion peculiarly his own, if, indeed, language so confessedly vague and indefinite can be said to embody an *opinion*. It is this: 'That the only sacrifice, A., or satisfaction with which the Christian has to do, is a moral and spiritual one; not the pouring out of blood upon the earth, but the living sacrifice "to do thy will, O God;" in which the believer has part as well as his Lord; about the meaning of which there can be no more question in our day than there was in the first ages.' —'Heathen and Jewish sacrifices rather show us what the sacrifice of Christ was not, than what it was. They are the dim, vague, rude, almost barbarous expression of that want in human nature which has received satisfaction in him only. Men are afraid of something; they wish to give away something; they feel themselves bound by something; the fear is done away, the gift offered, the obligation fulfilled in Christ. Such fears and desires can no more occupy their souls; they are free to lead a better life; they are at the end of the old world, and at the beginning of a new one.'—The work of Christ is set forth in Scripture under many different figures, lest we should rest in one only. His death, for instance, is described as a ransom. It is not that God needs some payment before he will set the captives free. Ransom is deliverance to the captive. 'Whosoever committeth sin is the servant of sin.' Christ delivers from sin. 'If the Son shall make you free, ye shall be free indeed.' To whom? for what was the ransom paid? are questions about which Scripture is silent, to which reason reason refuses to answer.

A remarkably original work on the Atonement was issued several years ago, by the Rev. John M'Leod Camp-

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bell. His views are as follows: The work of the Son of God who came to do and did the will of his Father, must, in view of the deliverance which he wrought, be regarded as twofold: first, as dealing with man on behalf of God, and second, as dealing with God on behalf of man.

In dealing with man on behalf of God, Christ revealed to us the Father in his relation to a sinful world, showed us what our sins were to God, vindicated in the world the Father's name, and witnessed to the excellency of that will against which we were rebelling. In thus revealing the will of the Father towards sinful men, he necessarily became a man of sorrow and suffering, but these arose naturally out of what he was, and the relation in which he stood to those for whom he suffered; and to the holiness and love of his very nature must we refer their awful intensity and immeasurable amount. He suffered what he suffered, through seeing sin and sinners with God's eyes, and feeling in reference to them with God's heart. By what he suffered, he condemned sin, and revealed the wrath of God against it. His holiness and love taking the form of suffering, compose the very essence and adequacy of his sacrifice for sin.

Again, in dealing with God on behalf of man, the oneness of mind with the Father which towards man took the form of condemnation of sin, became in his dealing with the Father in relation to us a perfect confession of our sins, which was a perfect Amen in humanity to the judgment of God on the sin of man. Such an Amen was due in the truth of all things, due on our behalf, though we could not render it, due from him as in our nature and our true brother. He who was the truth, could not be in humanity and not utter it; and it was necessarily a first step in dealing with the Father on our behalf. This confession of our sins by him who, as the Son of God and the son of man in one person, could perfectly measure and know the evil of man's alienation, was a peculiar development of the holy sorrow in which he bore the burden of our sins; and which, like his sufferings in confessing his Father before men, had a severity and intensity of its own. But apart from the sufferings present in that confession, this Amen from the depths of the humanity of Christ to the divine condemnation of sin, is necessarily conditioned by the reception into the bosom of the divine humanity, of the full apprehension of the wrath of God, as well as of the sin against which that wrath comes forth into his soul and spirit; and, so receiving it, he responds to it with a perfect response, and in that perfect response he absorbs it. For that response has all the elements of a perfect repentance in humanity, for all the sin of man—a perfect sorrow—a perfect contrition—all the elements of such a repentance, and that in absolute perfection; all—excepting the personal consciousness of sin—and by that perfect response or Amen to the mind of God, in relation to sin, is the wrath of God rightly met, and that is awarded to divine justice which is its due, and could alone satisfy it.

This confession of the world's sin by the Head and Rep-

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resentative of humanity, was followed up by his intercession as a part of the full response of the mind of the Son to the mind of the Father—a part of that utterance in humanity which propitiated the divine mercy by the righteous way in which it laid hold of the hope for man which was in God. 'He bore the sins of many, and made intercession for the transgressors.'

The Rev. F. D. Maurice professed to hold a purely biblical theology, as opposed to the theologies of consciousness, which he repudiates. He seeks his doctrine of the A. in the answer which the Bible gives to the demands of a sin-smitten conscience. A sinner requires, and is content to be told on the authority of Scripture, that the Son of God has taken away sin. This message from God is the gospel for all men. The sinner wants to be assured that God has spoken, that he has declared himself the Reconciler, and desires to be shown how and in whom he has accomplished that work on his behalf.

To this question—How and in whom the work of reconciliation has been accomplished?—Mr. Maurice replied, in effect and almost in words as follows: The will of God is set forth in the Bible to be a will which is good to all, and the ground of all that is right, true, just, and gracious; the Bible also sets forth the Son of God as being one in will, purpose, and substance with the Father, and that his whole life on earth was an exhibition of, and submission to, his Father's will; that the Son of God was Lord of men, the Root and Head of humanity, and the source of all light and righteousness in man: that being thus one with God and one with man, he brought the will of God into our nature, fulfilled it in our nature perfectly, and carried it down into the lowest condition into which it had fallen through sin; that in the fulfilment of this will in our nature, as its head, he shared its sufferings, enduring that wrath, or punishment which proceeded from Holy Love, thus making real in his own consciousness, on the one hand the sins of the world, and on the other the consuming fury of the holiness of the love of God—with an anguish which only a perfectly pure and holy Being, who is a perfectly sympathizing and gracious Being, can feel: that the man Christ Jesus was for this reason the object of his Father's continual complacency—a complacency fully drawn out by the death of the cross—which so perfectly brought out to view the uttermost power of self-sacrifice which lay hidden in the divine love; and consequently that Christ exhibited humanity, in its head, atoned for, reconciled. In this way, to Mr. Maurice, is Christ 'the Lamb of God, who taketh away the sin of the world.'

Finally, Dr. Trench, who may be regarded as fairly representing the prevalent views of the more devout and thoughtful men of the present day holding 'orthodox' opinions, speak as follows: 'The spirit of man cries out for something deeper than repentance, confession of sin, amendment of life; something which shall reach further back; which shall not be clogged with sinful infirmities, as his own repentance even at the very best must be.

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Men cry for some work to rest upon, which shall not be *their* work, but which shall be God's; perfect, complete. They feel that there must be something which God has wrought, not only *in* them, but also and first of all *for* them; they yearn for this, for A., propitiation, ransom, and conscience purged from dead works by the blood of sprinkling; a rock to flee to which is higher than they, than their repentance, than their faith, than their obedidience, even than their new life in the spirit. Now, this rock is Christ; and John the Baptist pointed to this rock, when, to those about him who longed after more than amendment of life, he exclaimed, in the memorable words: "Behold the Lamb of God which taketh away the sin of the world."'

Christ's sacrifice was vicarious—he died not merely for the good of, but in the room and in the stead of, others; tasted death *for* them. He did this of his own free will. He saw that nothing else would overcome their sinful perversity and wilful obduracy, and that this would be effectual to do so.

Christ took upon himself the penalties of a sinful world, and his self-sacrifice is only *not* righteous, because it is so much better than righteous, because it moves in that higher region where law is no more known, but known no more only because it is transfigured into love. Vicarious suffering is the law and condition of all highest nobleness in the world. It is this which God is continually demanding of his elect, they approving themselves his elect as they freely own themselves the debtors of love to the last penny of the requirements which it makes.

But the sufferings and death of Christ were not merely vicarious, they were also satisfactory; and thus atoning or setting *at one*, bringing together the holy and the unholy, who could not have been reconciled in any other way. It is not maintained that God could have pleasure in the sufferings of the innocent and the holy, and that innocent and holy his own Son; but only that he must have the highest pleasure in the love, the patience, the obedience which those sufferings gave him the opportunity of displaying, which but for those he never could have displayed. Christ's sublime devotion to the will of God permitted the Father to say, 'I have found a ransom.' Christ satisfied herein, not the divine anger, but the divine craving and yearning after a perfect holiness, righteousness, and obedience in man, which craving no man had satisfied, but all had disappointed before.

Dr. Horace Bushnell has written on the A. with wonderful spiritual insight and with rich suggestiveness. His views on the A. have entered deeply as a modifying force into the recent thought of the church at large. His theory, however, is not so formulated as to yield itself easily to a logical classification, except that it has a leading place among 'moral influence theories.'

See the following works, consulted and used in the preparation of this article: Baur's *Christliche Lehre von der Versöhnung;* Hase's *Hutterus Redivivus;* Neander's *Christ-*

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liche Dogmengeschichte; Giseler's *Lehrbuch der Dogmengeschichte;* Hagenbach's *Lehrbuch der Dogmengeschichte,* vierte Auflage; Calvin's *Institutes of the Christian Religion;* Edwards, *Concerning the Necessity and Reasonableness of the Christian Doctrine of Satisfaction for Sin;* Owen's *Death of Death in the Death of Christ,* and *Of the Death of Christ;* Payne's *Lectures on Divine Sovereignty;* Chalmers's *Institutes of Theology;* Wardlaw's *Systematic Theology;* Campbell's (John M'Leod) *Nature of the Atonement,* etc.; Tayler's (J. J.) *Christian Aspects of Faith and Duty* (Discourse on 'Christ the Mediator'); Maurice's *Theological Essays;* Jowett's *St. Paul's Epistles,* first and second editions (Article 'On Atonement and Satisfaction'); Trench's *Five Sermons* (sermon on 'Christ the Lamb of God.') See also Bushnell's *The Vicarious Sacrifice;* Shedd's *History of Christian Doctrine.*

ATONIC, a. *ă-tŏn'ĭk* [Gr. *a,* not; *tonos,* tone]: wanting tone; debilitated. ATONY, n. *ăt'ŏ-nĭ,* loss of vital energy.

ATOP, ad. *ă-tŏp'* [AS. *a,* on, and *top*]: at or on the top.

ATRABILIARY, a. *ăt'ră-bĭl'ĭ-ĕr-ĭ,* or ATRABILIAR, a. *ăt'ră-bĭl'ĭ-er,* or ATRABILA'RIAN, a. *-ā'rĭ-ăn,* [F *atrabilaire*—from mid. L. *atrabilārĭus,* abounding in black bile—from L. *ater,* black; *bilis,* bile]: causing black bile; melancholic; hypochondriac. ATRABILIOUS, a. *ăt'ra-bĭl'ĭ-ŭs,* having abundance of black bile, as the supposed cause of melancholia; melancholic; hypochondriac.

ATRACTENCHYMA, n. *ăt'răk tĕng'kĭm-ă* [Gr. *atraktos,* a spindle, a distaff; *chumos,* juice, sap]: in *bot.,* tissue composed of spindle-shaped cells.

ATRAMENTACEOUS, a. *ăt-ra-mĕn-tā'shŭs,* or ATRAMEN'TAL, or ATRAMEN'TOUS, *-tŭs* [L. *atramentum,* anything black; ink—from *ater,* dull-black; Eng. *aceous*]: pertaining or relating to ink; inky; black as ink. ATRAMENTA'RIOUS, a. *-tā rĭ-ŭs,* suitable to be employed in the manufacture of ink. Applied especially to copperas, one of its ingredients.

ATRATO, *â-trâ'tō:* river of Colombia, important not by its size, but by its position in connection with the scheme of communication by water between the Atlantic and the Pacific. Such use of the A. was long ago predicted by Humboldt.

The main stream falls into the Gulf of Darien by nine mouths—the quantity of water, from the almost daily rains, being large in proportion to the area drained, which does not, at the utmost, exceed 300 m. by 75. Of the nine mouths, the third in rank, the Boca Coquito, appears to offer the most available facilities for improving the navigation. About 220 m. above this entrance, opposite to Quibdo, the A. is 850 ft. wide and 8 ft. deep at the shallowest parts, while the entire fall to the sea averages less than three inches to a mile. Unfortunately, however, the A. itself cannot advantageously be followed thus far, because, as one advances to the south, the intervening ridge to the west, and its streams toward the Pacific become less and less practicable.

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A comparatively convenient route was surveyed through the munificence of Mr. F. M. Kelley, a private citizen of New York. Ascending the Boca Coquito as before, this route leaves the main stream at a distance of 63 m. from the sea, following the Truando, one of its western affluents, for 36 m. more without impediment or interruption. From this point on the Truando to the Pacific there remain 32 m. The heaviest work would be a tunnel of 3¼ m. in length. According to the plan the canal would be without a lock. The plan (commended as the result of examination by the U. S. govt., 1871), utilizing the middle branch of the A. and the Jurador, flowing into the Pacific, would require 48 m. of canal. At the International Congress, Paris, 1879, for deciding the best route for the interoceanic canal, the A. route was, with various others, discussed and rejected in favor of one from Limon to Panama.

ATRI, *ä'trē* (*Hadria Picena*): town of Italy, 14 m. s.e. of Teramo; on a steep hill, 6 m. from the Adriatic. Numerous remains of public buildings, baths, and walls attest its ancient importance. Pop. 4,000.

ATRIP, ad. *ă-trĭp'* [*a*, and *trip*]: said of an anchor when just raised off of the ground in a perpendicular direction. A topsail is A. when it is just started from the cap.

AT'RIPLEX: see CHENOPODIACEÆ: ORACHE.

ATRIUM, n. *āt'rĭ-ŭm* [L. *atrĭum*, a front hall]: in *zool.*, the cavity or cloaca into which the intestine opens in the *Tunicata:* in *anat.*, that portion of the auricle of the heart into which the venous blood is emptied. ATRIAL, a. *āt'rĭ-ăl*, designating a water-vascular system, furnished with contractile dilatations supposed to be a rudimentary respiratory apparatus, but probably only a secretory organ.

AT'RIUM, in Rom. Arch.: the covered court or entrance-hall which was the chief part of a Roman house. It was lighted from the roof, which sloped toward an opening in the centre (the *compluvium*), through which the rain-water flowed into a kind of cistern situated on the floor (the *impluvium*). On both sides, passages led to the several chambers. Its size was in proportion to the other parts of the house. After the burning of Rome in the reign of Nero, great attention was paid to the decorations of the entrance-halls or *atria*. Here the female slaves were engaged in weaving and other domestic occupations, under the superintendence of their mistress. Family pictures were preserved in the A.; it also contained the nuptial couch, and it served as a general waiting-room for visitors and clients. The *atria* of the temples were used as places of assembly.

ATROCIOUS, a. *ă-trō'shŭs* [F. *atroce*—from L. *atrōcem*, horrid, terrible]: very wicked; extremely cruel; criminal in the highest degree. ATRO'CIOUSLY, ad. *-lĭ*. ATRO'CIOUSNESS, n. the quality of being atrocious. ATROCITY, n. *ă-trŏs ĭ-tĭ* [F. *atrocité*, great cruelty—from L. *atrocĭtātem*]: enormous wickedness; cruelty in the highest degree.—SYN. of 'atrocious': heinous; flagitious; flagrant; enormous; grievous.

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AT'ROPA: see BELLADONNA.

ATROPHY, n. *ăt'rō-fĭ*, or ATROPHIA, n. *ă-trō'fĭ-ă* [Gr. *atrophiă*, want of food or nourishment—from *a*, without; *trophē*, nourishment]: a wasting away without manifest cause; a consumption; a morbid condition of animal or vegetable life, resulting in deficient nutrition of the body, or part of the body, and consequent decay and waste of its substance. The term is applied, not to the mere withholding the requisite supply of nutriment, but to the condition produced by various diseases that affect the body. See NUTRITION: also DIGESTION: DYSPEPSIA: HYPERTROPHY. ATROPIC, a. *ă-trŏp'ĭk*, wasted; defectively nourished; in *bot.*, exhibiting an abortion and degeneration of organs. ATROPHIED, a. *ăt'ro-fĭd*, unfed; not supported by their proper nourishment; hence, wasting, or wasted away. (Used of muscles, nerves, etc.)

ATROPIA, n. *ă-trō'pĭ-ă*, or ATROPIN, n. *ăt'rō-pĭn*, or ATROPINA, n. *ă-trō'pĭ-nă*, $C_{17}H_{23}NO_3$ [*Atrŏpos*, in *anc. myth.*, one of the Fates, whose duty it was to cut short the thread of life]: a very poisonous alkaloid, existing in all parts of the deadly night-shade (*Atropa Belladonna*), and in the seeds of the thorn apple (*Datura Stramonium*); hence called also DATURA or DATURINE. The pharmacopœial directions for extracting it from the roots of belladonna by means of alcohol are somewhat complicated. It is first taken up in combination with malic acid, which is removed by the addition of lime; sulphuric acid is then added, which throws down the lime and forms sulphate of atropia; the atropia is liberated by potassium carbonate, which also separates and resolves impurity, and is taken up by chloroform, which, after being distilled off, leaves A., which must be finally purified by decolorization with charcoal, and crystallization from an alcoholic solution. The crystals occur in colorless silky needles, united in tufts. A. is a highly poisonous irritant narcotic; a mydriatic antispasmodic and anodyne; in small doses a cardiac, respiratory, and spinal stimulant; in large doses, a paralyzer of the secretory and motor nerve-endings. It is extensively used in treatment of diseases of the eye, to dilate the pupil, and to paralyze the accommodative act. The effect of A. on the pupil is most marked, and the quantity required is infinitesimal, variously stated from $\frac{1}{10000}$ gr. (Wood) to $\frac{1}{100000}$ gr. (Donders). ATROPISM, n. *ăt'rō-pĭzm*, the symptoms produced by the frequent medicinal use of belladonna.

ATROPOUS, a. *ăt'rŏ-pŭs*, or ATROPAL, a. *ăt'rŏ-păl* [Gr. *a*, without; *tropē*, a turning]: in *bot.*, the ovule with foramen opposite to the hilum; an ovule having its original, erect position.—SYN.: orthotropous, and orthotropal.

ATROWLI, *â-trow'lē*: town of British India; chief place of a pergunnah of the same name; in the dist. of Allygurh, N.W. Provinces; 63 m. n.n.e. from Agra. The streets are wide, the bazaar good, and the supply of water abundant. Pop. (1871) 15,052; (1891) 15,408.

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A'TRYPA: genus of fossil brachiopod or lamp shells, having close resemblance to the well-known *Terebratula*. It possessed a perforation for the passage of the peduncle, by which the animal attached itself to foreign bodies. This foramen is not visible in all examples of the same species, from the beak touching and overlying the umbo of the other valve; the animal was, therefore, probably free during a portion of its existence. The name (derived from *a*, without, and *trypa*, foramen) was given to this genus by Dalman, as he erroneously supposed that the perforation was entirely absent. Judging from the markings on the interior of the shell, the animal seems to have differed little from the recent *Rhynconella*, except that it had large calcareous spines for the support of its labial appendages. A. is a strictly palæozoic brachiopod, the solitary Permian species being the last representative of the genus. Of the 179 described species, 100 are Silurian, 56 Devonian, 22 Carboniferous, and 1 Permian.

ATTACCA, n. *ăt-tăk'ka* [Ital. *attaceo*, a sticking, a cleaving to—from *attacare*, to hang, to fasten]: in *mus.*, a direction given at the end of a movement to proceed to the next one without any intermediate pause. (Often with the word *subito*.)

ATTACH, v. *ăt-tăch'* [F. *attacher*, to tie, to bind, to fasten: *at* for *ad*. or F. *a*, to; Breton *tach*, a nail; *tacha*, to fasten with a nail: Ir. *taca*, a peg: It. *attaccare*, to attach]: to fasten or hang; to take by legal authority; to arrest; to fix; to win or gain over. ATTACH'ING, imp. ATTACHED, pp. *ăt-tăcht'*. ATTACH'ABLE, a. *-ă-bl*. ATTACH'MENT, n. seizing of goods by legal authority; warm affection; fidelity; strong regard to. ATTACHÉ, n. *ăt-tă-shā* [F.]: one (generally a young diplomatist) attached to an ambassador as one of his suite or attendants.—SYN. of 'attach': to fix; affix; connect; combine; unite; tie; tack; fasten; subjoin; annex; charm; enamour; win;—of 'attachment': affection; inclination; adherence; fidelity; attendance; regard; adjunct.

ATTACH'MENT, in Law: a writ applying both to persons and to property. A. of Person is a process issued by a court of record, directing the sheriff to produce before it the person within named, guilty of contempt of court, either by neglect or abuse of its process or of subordinate powers, or disregard of its injunction, and it is in some degree in the nature of a criminal process.

A. of Property is generally in the instance of debt, being issued to the creditor as against the property of the debtor. Its issuance is from a court of law, courts of equity having no power in the premises: in some states, however, it is authorized in chancery. In New England a writ of A. is always incident to a summons in actions upon contract, but in the other states it is issued only upon affidavit showing cause, verifying the plaintiff's base of action, and exhibiting grounds of A. in accordance with the local statute authorizing the writ. In general, the remedy by A. is allowed only to a creditor; in some states, however, there are special

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statutory provisions by which damages arising *ex delicto* may be sued for by A. Corporations may be proceeded against by A.; but heirs, executors, administrators, trustees, and others acting only as representatives, are not liable, as such, in this manner.

The levy of an A. does not change the estate of the defendant in the property attached; nor does the attaching plaintiff acquire any property thereby; nor can he acquire through his A. rights to the property attached, not inhering in the defendant at the time of A.: unless he be able to show the existence of fraud or collusion impairing his rights. The levy constitutes a lien on the property or credits attached, but this lien is of no value unless the plaintiff obtain judgment against the defendant, and proceed to subject the property to execution. Where two or more attachments are levied simultaneously against the same property, they are entitled severally to an aliquot part of the proceeds of the property. Where several attachments are levied successively on the same property, a junior attaching creditor may impeach a senior A., or judgment thereon, for fraud. During the pendency of a suit, an officer may deliver over attached property in his hands to some responsible person, styled a receipter or bailee, who must receipt for it while awaiting the action of the court. In some states possession may be retained by the defendant by executing a bond with sureties for the delivery thereof, either to satisfy the execution, or when and where the court may direct. An A. may be dissolved by a final judgment for the defendant, or, on motion, on account of defects in the plaintiff's proceedings, apparent on their face.

Garnishment is an effectual A. of the defendant's effects in the garnishee's hands, but no judgment can be rendered against the garnishee until judgment against the defendant shall have been recovered. A debt not due may be attached in the hands of the garnishee, but he cannot be required to pay the same until it becomes due.

ATTACH'MENT, FOREIGN: see FOREIGN ATTACHMENT.

ATTACK, v. *ăt-tăk'* [F. *attaquer;* Sp. *atacar*, to attack (see ATTACH)]: to fall upon with force or violence; to assault; to assail in words; to begin to dissolve as a chemical agent: N. a falling upon with violence; satire; unfriendly criticism. ATTACK'ING, imp. ATTACKED, pp. *ăt-tăkt'*.—ATTACK'ABLE, a. *-a-bl*, able to be attacked. ATTACK'ER, n. *-ér*, one who attacks.—SYN. of 'attack, v.': to assail; assault; encounter; invade;—of 'attack, n.': onset; charge.

ATTACK', in Warfare: an advance upon the enemy, with a view of driving him from his position, whether in the open field or within fortifications.

In an attack in the open field, the general first ascertains the strength and position of the enemy, by means of a reconnaissance or of spies. He then seeks to discover at what point the enemy can make the least resistance, generally on one or other flank. He next arranges to concentrate his chief strength upon this particular point; and to mask his

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real intention by feigned operations in other places. He then attacks with energy and force; his troops advancing without halt till near enough to use their weapons with the greatest effect. The more the attack has the character of a 'surprise,' the greater the probability of its success. In order to make this success as much felt as possible, and to be provided also against unforeseen disaster, the attacking body should be followed at a distance by a reserve; a neglect of this precaution has frequently caused the entire failure of an attack. Various forms have been devised for the attack; but the usual form is the *parallel* or *frontal*. Frederick the Great, however, won most of his battles by the oblique attack, in which one wing is more advanced than the other. The first Napoleon preferred, by means of his heavy columns, to penetrate and break up the enemy's centre. Another mode combines an attack on one flank as well as in front, by two separate corps; so as either to get into the enemy's rear, or to perplex him as to his retreat. A skilful general will be guided by circumstances in his selection among these modes. An attack by night might act most signally as a surprise; but as this requires a very exact knowledge of the ground, an attack at early dawn is generally preferred.

The different arms of the service render each its own kind of aid during an attack. First come the skirmishers, or perhaps whole battalions of light and active troops, whose rifles or long-range guns commence the firing. Then come the main body of infantry in heavy column; they halt within musket-shot, fire, and charge with the bayonet—the skirmishers meanwhile deploying round to the rear of the column, but holding themselves in readiness to harass the enemy's flanks. English troops especially excel in the attack by bayonet in line; many other armies rely more on the momentum of a compact and heavy column in an attack. There are positions in which the cavalry attack, with its shock and the use of the sword, is more efficacious than that of the infantry. The troopers approach at a trot, break into a gallop at a distance of one or two hundred paces from the enemy, and endeavor by their weight and impetuosity to force the enemy's line. There are many forms of cavalry attack, according to the nature of the ground and the position of the enemy. The artillery, working at a distance, often begin an A. long before the infantry and cavalry can come up, harassing and confusing the enemy. At 800 to 1200 yds. distance, the artillery pour out shot and shell, and try to silence the enemy's guns, so as to make way for the A. of the infantry; while the bayonet-charge is being made, the artillery keep in check the enemy's cavalry. If the A. succeeds, the infantry and artillery take up the ground recently occupied by the enemy, leaving the cavalry and riflemen to maintain a pursuit; but if it fail, the artillery and cavalry take up such positions as will cover the retreat of the infantry.

In an A. upon a fortress, the operation is a part of that of besieging (see SIEGE); but very often intrenchments are attacked in the open field. Such an A. has the character

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of a surprise, when the works are approached under cover of night, and an attempt is made to break into them on all sides. In such case there is a reserve corps, which is rapidly brought up when wanted; but the attacking corps retire behind the reserve if repulsed. The artillery post themselves on the prolongation of the line of works, and try to dislodge the enemy's guns and gunners; or pour a concentric fire sufficient to breach the works. The infantry advance as close as will enable them to fire upon the gunners. When the enemy's fire is silenced, the engineers (under cover of the artillery) proceed to remove palisades and all other obstacles, and to bridge over ditches and openings. Then follow the operations of the storming-party. See ASSAULT.

ATTACUS, n. *ăt'tăk-ŭs* [L. *attacus*—from Gr. *attakos* and *attakes*, a kind of locust]: genus of moths belonging to the family *Bombycidæ*. *A. Cynthia* is the Ailanthus Silkworm, so called because its caterpillar feeds upon the Ailanthus-tree, *Ailanthus glandulosus*.

ATTAGAS, n. *ăt'ta-găs*, or ATTAGEN, n. *ăt'ta-jĕn* [Gr. *attagas*. a long-billed bird, fond of the water, and esteemed a great delicacy. The Godwit (?). Also L. *attagen*, a hazel-hen, or heath-cock, found in Spain, the south of France, etc.]: the *attagas* of Buffon, the *attagen* of Aldrovandi, is believed by Cuvier to be the young or the female of *Tetras bonasia*, and the *attagen* or *g ınga* to be the pintailed grouse. The latter of these is found all round the coasts of the Mediterranean.

ATTAIN, v. *ăt-tān'* [F. *atteindre*, to touch, to attain—from L. *attingĕrĕ*, to touch against—from L. *ad*, *tango*, I touch]: to come to or reach by exertion; to arrive at; to gain; to achieve. ATTAIN'ING, imp. ATTAINED, pp. *ăt-tānd'*. ATTAINABLE, a. *ăt-tān'ă-bl*, that may be attained by efforts of the body or mind. ATTAIN'ABIL'ITY, n. *-bil'ĭ-tĭ*, or ATTAIN'ABLENESS, n. *-bl-nĕs*, the quality of being attainable. ATTAIN'MENT, n. the act of arriving at or reaching by effort; proficiency in any branch of knowledge.—SYN. of 'attain': to acquire; obtain; gain; win; earn; procure.

ATTAIN'DER: the legal consequence of judgment of death or outlawry, in respect of treason or felony; formerly involving *forfeiture of estate*, real and personal, and *corruption of blood*, and generally, in present usage, involving extinction of civil rights and capacities. Thus, an attainted person cannot sue in a court of justice; he loses all power over his property; and he is by his A. rendered incapable of performing any of the duties or entering into any of the privileges of a free citizen. But absolute and severe as formerly were the consequences of A., neither the government nor the crown could exercise absolute or capricious authority regarding an attainted person; everything was to be according to principle and rule, and for the ends of public justice. Formerly an attainted person

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could not give evidence in a court of justice; but that disability has been removed.

Since the revision of the law, 1870, the forfeiture of estate and corruption of blood by A. are no longer legal in Britain. For A. by express legislative enactment in parliament, see BILL OF ATTAINDER. In the United States A. has never had legal existence, being utterly forbidden by the federal constitution (art. i. sec. 9), 'No bill of attainder or ex-post facto law shall be passed.'

ATTAINT, v. *ăt-tānt'* [OF. *attaindre*, to accuse, to stain; *attaint*, accused, stained—from L. *attingĕrĕ*, to touch against —from L. *ad*, to; *tingo*, I stain, or *tango*, I touch]: to reach or attain to; to corrupt; to taint; to disgrace; to find guilty of treason or felony; to render infamous: N. a stain; reproach; hurt. ATTAINT'ING, imp. ATTAINT'ED, pp. ATTAINTURE, n. *ăt-tān'tūr*, state of being attainted. ATTAINDER, n. *ăt-tān'dĕr*, that which renders impure; in Britain, the act of parliament decreeing the loss of civil rights and estate for the crime of treason or other capital offense, is called an *Act of Attainder;* the judicial process is called a *Bill of Attainder*. (*Note.*—There can be but little doubt that *tango*, I touch, and not *tingo*, I stain, is the primary root-word. The confusion has arisen from the fact that the reputation of a person is *reached* or *touched* by the sentence of a court of justice, and so his character is disgraced and stained, and becomes attainted; etymologically, to *attaint* is 'to convict,' and *attainder* is 'the conviction' —see Skeat and Wedgwood.)

ATTAINT', WRIT OF: anciently in England a mode of inquiring whether a jury had given a false verdict; now abolished.

ATTAKAPAS, *ăt-tŭk'a-pâ:* a large and fertile district in the s.w. of Louisiana, which includes the parishes of Iberia, Lafayette, St. Martha, St. Mary, and Vermillion. It is chiefly remarkable for its large production of sugar and molasses.

ATTALEA, *ăt-tă-lē'a*: genus of palms, comprising a number of species, natives of the tropical parts of S. America. They have in general lofty, cylindrical, smooth stems, but there are some stemless species. The leaves are large and pinnate. The fruit has a dry, fibrous husk, inclosing a nut with three cells and three seeds. The leaves of some species are much used for thatching, and those of some are woven into hats, mats, etc. The nuts of *A. excelsa* and of *A. speciosa* are burned to dry the India-rubber obtained from the *Siphonia elastica*, which acquires its black color from their smoke. The leaf-stalks of *A. funifera*, found in the s. maritime provinces of Brazil, and there called Piassaba, yield a fibre much used for cordage The ropes made of it are very strong, and extremely durable in salt water. The Piassaba palm of the n parts of Brazil, however, is totally different, and much of the Piassaba (q.v.) fibre exported to other countries is obtained from it. The fruit of *A. funifera*, known by the name of Coquilla nut (q.v.) is as large as an ostrich's egg, and supplies a kind

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of vegetable ivory, used for making umbrella handles, etc. The fruit of *A. compta*, the Pindóva or Indajá palm, is of the size of a goose's egg, and the kernels are eatable. It is a stately and beautiful tree, with a wide-spreading crown.

ATTAR, n. *ăt'tăr*, or OTTO OF ROSES, *ŏt'tō* [Hind. *atr*, essence: Arab. *itr*, perfume]: a precious oil made in eastern countries, generally from roses; a valuable perfume. See OTTO.

ATTELABUS, n. *ăt-těl'a-bŭs* [L. *attelabus*—from Gr. *attelabos*, a small, wingless species of locust]: genus of Coleoptera (Beetles), belonging to the family *Curculionidæ*, or *Weevils;* originally introduced by Linnæus with the character, 'Head attenuated, behind inclined. Antennæ somewhat thick towards the apex.' In the 13th edition of his *Systema Naturæ* (1767), as many as thirteen species are enumerated. Most of these, however, are now transferred to the genus Coleoptera.

ATTEMPER, v. *ăt-těm'pĕr* [OF. *atemprer*, to modify—from L. *ad*, to; *tempĕro*, I mix in due proportion]: to mix in proper proportions; to soften or moderate; to modify; to mingle. ATTEM'PERING, imp. ATTEM'PERED, pp. *-pĕrd*. ATTEM'PERLY, ad. *-lĭ*, in *OE.*, in a temperate manner. ATTEM'PERMENT, n. the act of tempering, or the state of being tempered.

ATTEMPT, v. *ăt-těmt'* [F. *attenter*, to attempt: OF. *atempter*, to undertake; *tempter*, to try—from L. *ad*, to; *tento*, I try]: to try; to make an effort to accomplish; to endeavor: N. an attack; an endeavor to gain a point. ATTEMPT'ING, imp. ATTEMPT'ED, pp. ATTEMPT'ER, n. one who. ATTEMPT'ABLE, a. *-ă-bl*, that may be attempted or tried. ATTEMPTABILITY, n. *ăt-těmp-ta-bĭl'ĭ-tĭ*, capability of being attempted; a person or persons, or a thing or things capable of being attempted. ATTEMPTATE, n. *ăt-těm'tăt*, an attempt or endeavor, especially to commit a crime. In 1589, Puttenham ranked this word as one quite recently introduced into the language. It arose, however, somewhat earlier than he thought.—SYN. of 'attempt, n.': trial; exertion; endeavor; effort; attack; essay.

ATTEMPT, to commit a felony or criminal offense: in many instances equally cognizable by the criminal tribunals with the completed crime itself. See TREASON: FELONY: MISDEMEANOR.

ATTEND, v. *ăt-tĕnd'* [F. *attendre:* OF. *atendre*, to wait: It. *attendere*, to expect, to await—from L. *attendĕrĕ*, to attend—from L. *ad*, to; *tendo*, I stretch out]: to wait on; to accompany; to be present; to listen to; to fix the attention upon. ATTEND'ING, imp. ATTEND'ED, pp. ATTEND'ANT, n. a follower; a servant: ADJ. accompanying; being present. ATTENDANCE, n. *ăt-tĕn'dăns*, act of serving or waiting on; duty; in *OE.*, attention; regard. ATTENTION, n. *ăt-tĕn'shŭn* [F.—L.]: the act of attending; paying heed to; steady application of the mind; act of courtesy. ATTENTIVE, a. *ăt-tĕn'tĭv*, paying due regard to; mindful. ATTENT', a. [L. *attentus*, attentive]: contr. for *attentive*.

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ATTEN'TIVELY, ad. *-tĭv-lĭ.* ATTEN'TIVENESS, n. the quality of being attentive. To DANCE ATTENDANCE. to wait on and obey the caprices of another obsequiously.—SYN. of 'attend': to mind; regard; notice; heed; wait on: hearken; listen; accompany; escort;—of 'attention': application; study; care; heed; consideration; regard; respect; advertence;—of 'attentive': careful; mindful; observant; watchful; circumspect; intent.

ATTENTATES, n. pl. *ăt-tĕn'tāts* [Fr. *attentat*, an attempt—from L. *attentata*, nom. plu. of pp. of *attento*, to stretch out, to attempt]: proceedings in a court of judicature, pending suit, and after an inhibition is decreed; things done after an extra-judicial manner.

ATTENUATE, v. *ăt-tĕn'ū-āt* [L. *attenuātus*, made very thin—from *ad*, to; *tenŭō*, I make thin—from *tenŭis*, thin: F. *attenuer*]: to make very thin; to reduce in thickness or density. ATTEN'UATING, imp. ATTEN'UATED, pp. ATTENUATION, n. *ăt-tĕn'ū-ā'shŭn* [F.—L.]: the act of making thin, fine, or slender. ATTENUANT, a. *ăt-tĕn'ū-ănt*, making thin: N. a medicine which attenuates.

ATTERATE, v. *ăt'ter-āt* [L. *attero*, to rub at, towards, or against—from *ad*, to; *tero*, to rub]: to rub away; to form or accumulate by rubbing away. AT'TERATED, pp. AT'TERATING, imp. ATTERA'TION, n. *-ā'shŭn*, the process of wasting the land away by the action of the waves.

ATTERBURY, *ăt'er-bĕr-ĭ*, FRANCIS, Bp. of Rochester: 1662, March 6—1732, Feb. 15; b. Milton, near Newport Pagnel, Buckinghamshire; educated at Westminster School and Christ Church, Oxford. In 1693, he went to London, where his rhetorical powers soon won reputation. He became a royal chaplain, minister of Bridewell, and lecturer of St. Bride's. He was combative, turbulent, and ambitious; a caustic and reckless controversialist; and, as a zealous partisan of the ecclesiastical against the civil authority, he received promotion; becoming, 1704, Dean of Carlisle; 1707, Canon of Exeter. In 1710, he was chosen prolocutor to the lower house of convocation, and in the same year he had the chief hand, according to the common belief, in drawing up the famous defense of Dr. Sacheverell; in 1712, he became Dean of Christ Church; in 1713, he was made Bp. of Rochester and Dean of Westminster. The death of Queen Anne extinguished his hopes for the primacy, as his known character and Jacobite leanings made him no favorite with George I. His deep complicity in a succession of plots for the restoration of the Stuarts brought upon him at length the charge of treason, and, 1722, Aug., he was committed to the Tower. By a bill of pains and penalties, passed in the lords by 83 to 43, A., who had defended himself with great ability, was deprived of all his ecclesiastical offices, incapacitated from holding any civil or spiritual office in the king's dominions, and condemned to perpetual banishment. He settled in Paris, where he was active in Jacobite conspiracies till his death. His fame as a writer rests

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chiefly on his letters to Pope, Swift, etc.; as a letter-writer, indeed, he has seldom been surpassed.

ATTEST, v. *ăt-tĕst'* [F. *attester*, to attest—from L. *attestāri*, to bear witness to—from L. *ad*, to; *testor*, I bear witness—from *testis*, a witness]: to bear witness to; to certify; to affirm solemnly in words or writing. ATTEST'ING, imp. ATTEST'ED, pp. ATTES'TOR or ATTES'TER, n. one who. ATTESTATION, n. *ăt'tĕs-tā'shŭn* [F.—L.]: the act of bearing witness to; putting a name to a writing in order to show it to be authentic (see DEEDS: WILLS: WITNESSES: TESTING CLAUSE); in *mil.*, the act of signing a declaration and taking a verbal oath on the part of a recruit, that he will serve the sovereign faithfully for a specified number of years. ATTES'TATIVE, a. or ATTES'TIVE, a. *-tĭv*, attesting; containing an attestation.

ATTEYNANT, a. *ăt-tān'ănt* [L. *attinens*—from *attineo*]: attainable; appertaining.

ATTIC, a. *ăt'tĭk* [L. *Attĭcus:* Gr. *Attĭkos*, pertaining to Attica or Athens: It. *attico:* F. *attique*]: pertaining to Attica, a state in Greece; elegant; classical; applied by Athenian architects to an order or series of small square pillars placed upon the uppermost part of a building: N. an Athenian; a low story rising above the cornice that terminates the main elevation of a building; the flat or floor on the upper part of a house; a garret; in *arch.*, a plain or decorated parapet-wall on the upper part of the façade of a building. ATTICISM, n. *ăt'tĭ-sĭzm*, the purest style of the Greek language—Attic dialect being the dialect of Athens, in which most of the great works of Greek antiquity were written. ATTICIZE, v. *ăt'tĭ-sīz*, to make use of atticism. AT'TICIZ'ING, imp. ATTICIZED, pp. *ăt'tĭ-sīzd'*. ATTIC MUSE, n. *ăt'tĭk mūz*, a fine poetic vein.

ATTICA, *ăt'tĭ-ka:* one of the political divisions or states of Ancient Greece or Hellas, of which Athens was the capital. The territory is triangular, having its n.e. and s.w. sides washed by the sea, while on the n. it is connected with the mainland. In ancient times, it was bounded on the w. by Megaris and the Gulf of Saronica; on the s., which ran out into the 'marble steep' of Sunium, by the Ægean Sea; on the e., by the Ægean Sea; and on the n., by Bœotia, from which it is separated by a lofty range of hills, the most famous part of which was formerly called Cithæron. Ancient A. was thus walled in from the rest of Greece. The two principal rivers were the Cephissus and Ilissus; and if they exhibited the same features in ancient times as now, must have been mere mountain-torrents, dry in summer. The unfruitfulness of the soil, and the scarcity of water, compelled the inhabitants occasionally to send out colonies. According to ancient tradition, the aborigines of A. were civilized first under Cecrops, who is said to have come hither from Sais, at the mouth of the Nile in Egypt, about B.C. 1550; and to have introduced the culture of olives, and of several species of grain, as also to have implanted milder manners, and taught the worship of the gods. He is stated to have divided the country

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into twelve communities or states. This, however, was not the only division known in early A. A still older division into *phylai*, or tribes, existed, also a minute subdivision into *demoi*, or townships. By Theseus, Athens was united with the eleven other states of A. under one government, of which Athens was made the seat. After this union of the several states, the whole of A. shared in the fortunes of Athens (q.v.), and, under Vespasian, became a Roman province. On the division of the Roman empire, A. naturally fell into the hands of the Greek emperors. In A.D. 396, it was captured by Alaric, King of the Goths. It is impossible to determine precisely what its population was in ancient times. Clinton estimates it at upwards of half a million, but this is probably too large.

In the present arrangement, Attica and Bœotia form a dept. or govt. in the kingdom of Greece. The surface of the country is broken into hills and narrow plains. The most considerable hills are—Parnes, 4,634 ft.; Cithæron, 4,624; Pentelicus, famous for its marble in ancient times, of a white brilliant appearance and perdurable character, 3,641; and Hymettus, 3,368. The largest plains extend in the neighborhoods of Athens and Eleusis. As early as the time of Solon, A. was well cultivated, and produced wine and corn. Mount Hymettus was celebrated for its bees and honey, and metals were found in the range of Laurium. Figs, olives, and grapes are still cultivated. Goats and sheep find suitable pasturage; but the country does not now produce much grain. Pop. of A. and B. (1879) 185,364; (1889) 257,764.

ATTICUS, *ăt'ĭ-kŭs*, TITUS POMPONIUS: one of the most noble and generous men in ancient Rome: B.C. 109—B.C. 32: born a few years before the birth of Cicero. His excellent education with Torquatus, the younger Marius, and Cicero, was supplemented by a stay in Athens, where he remained many years, glad to be separated from the political distractions of his native land. After B.C. 65, when he was induced by Sulla to return to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take part in political affairs, though exerting much influence on pnblic matters. A. had inherited great wealth, which he had increased by judicious mercantile speculations. His mode of life was frugal. When he was informed that a disorder under which he was laboring was mortal, he voluntarily starved himself to death. Among his personal friends, Cicero held the first place. The *Annales*, written by A., containing genealogical histories of the old Roman families, were highly commended by his contemporaries. In A. fine culture and a fortunate social position had highly developed the faculty of good taste. He had no creative genius, but was possessed of such delicate discernment that he could detect the flaw that would have been invisible to Cicero. Every author was anxious to secure his favorable opinion. None of his writings have been preserved. His biography is found in Cornelius Nepos, and in Cicero's *Epistles to A.*

ATTIGUOUSNESS, n. *ăt-tĭg'ū-ŭs-nĕs* [Eng. *attiguous*—

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from L. *attiguus*—from *attigo*, old form of *attingo*, to touch]: the quality of being attiguous; contiguity.

ATTILA, *ăt'il-a* [Ger. *Etzel;* Hungarian, *Ethele*, conjectured to have been originally titles of honor]: King of the Huns (d. 453); son of Mundzuk, a Hun of the royal blood. In 434, he succeeded his uncle Roas as chief of countless hordes scattered over the n. of Asia and Europe. His brother Bleda, or Blödel, who shared with him the supreme authority over all the Huns, was put to death by A. 444 or 445. The Huns regarded A. with superstitious reverence, and Christendom with superstitious dread, as the 'Scourge of God.' It was believed that he was armed with a supernatural sword, which belonged to the Scythian god of war, which must win dominion over the whole world. It is not known when the name 'Scourge of God' was first applied to A. He is said to have received it from a hermit in Gaul. The whole race of Huns was regarded in the same light. In an inscription at Aquileia, written a short time before the siege in 452, they are described as *imminentia peccatorum flagella* (the threatening scourges of sinners). The Vandals, Ostrogoths, Gepidæ, and many of the Franks, fought under his banner, and in a short time his dominion extended over the people of Germany and Scythia—i.e., from the frontiers of Gaul to those of China. In 447, after his unsuccessful campaign in Persia and Armenia, he advanced through Illyria, and devastated all the countries between the Black Sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The emperor Theodosius collected an army to oppose the inundation of the barbarians, but was defeated in three bloody engagements. Constantinople owed its safety solely to its fortification and the ignorance of the enemy in the art of besieging; but Thrace, Macedon, and Greece were overrun; seventy flourishing cities were desolated, and Theodosius was compelled to cede a portion of territory south of the Danube, and to pay tribute to the conqueror, after treacherously attempting to murder him. In 451, A. turned his course to the West, to invade Gaul, but was here boldly confronted by Aëtius, leader of the Romans, and Theodoric, King of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne—called anciently the Catalaunian Plain—waited to meet the enemy. The army of the West, under Aëtius and Theodoric, encountered the forces of the Huns near the site now occupied by the city of Chalons-sur-Marne. Both armies strove to obtain the hill of moderate height which rises near Mury, and commands the field of battle, and after a terrible contest the ranks of the Romans and their allies, the Visigoths, were broken. A. now regarded victory as certain, when the Gothic prince, Thorismund, immediately after his father had fallen, assumed the command, and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and A. with difficulty

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escaped into his encampment. This, if old historians are to be trusted, must have been the most sanguinary battle ever fought in Europe; for it is stated by contemporaries of A. that not less than 252,000 or 300,000 slain were left on the field. A. having retired within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pile, resolving to die in the flames rather than surrender; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. In the following year, A. had recovered his strength, and made another incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, Apennines, and the lagoons of the Adriatic Sea, where they founded Venice. The Roman emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of Pope Leo I., who visited the dreaded barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans, and old chronicles relate that the apostles Peter and Paul visited the camp of A., and changed his purpose. By 453, however, A. appears to have forgotten the visit of the two beatified apostles, for he made preparations for another invasion of Italy, but died of hemorrhage on the night of his marriage with the beautiful Ildiko. His death spread consternation through the host of the Huns. His followers cut themselves with knives, shaved their heads, and prepared to celebrate the funeral rites of their king. It is said, that his body was placed in three coffins —the first, of gold; the second, of silver; and the third, of iron; that the caparison of his horses, with his arms and ornaments, was buried with him; and that all the captives who were employed to make his grave were put to death, so that none might betray the resting-place of the King of the Huns.

Jornandes describes A. as having the Mongolian characteristics—low stature, a large head, with small, brilliant, deep-seated eyes, and broad shoulders.

ATTIRE, v. *ăt-tīr'* [OF. *atour*, female head-dress; *atirer*, to adorn—from O. Ger., and O. Sax *tir*, glory]: to adorn with garments; to dress; to array: N. clothes; apparel. ATTIR'ING, imp. ATTIRED, pp. *ăt-tīrd'*. ATTIR'ER, n. one who.

ATTITUDE, n. *ăt'tĭ-tūd* [F. *attitude*, posture—from It. *attitu'dine*, disposition to act: Sp. *actitúd*, attitude, position]: position of persons or things; posture; a position assumed or studied to serve a purpose. ATTITUDINAL, a. *ăt'-tĭ-tū'dĭ-năl*, pertaining to. ATTITUDINIZE, v. *ăt'tĭ-tū'dĭ-nīz*, to assume affected airs or postures. AT'TITU'DINI'ZING, imp. AT'TITU'DINIZED, pp. *-nīzd*. ATTITUDINARIAN, n. *ăt-tĭ-tū-dĭn-ā'rĭ-ăn*, one who gives particular attention to attitudes.—SYN. of 'attitude': posture; action; gesture; gesticulation; appearance.

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ATTLE, n. *ăt'tl* [perhaps corrupted from *addle*, rotten, which see]: a term used in Cornwall for rubbish thrown out of a mine, containing little or no ore.

ATTLEBOROUGH, *ăt'tl-bŭr-rō:* post village in the tp. of A., Bristol co., Mass., 31 m. n.e. from Boston, on the Boston and Providence railroad. The township is situated on Ten Mile river. Chief manufactures are clocks, jewelry, and buttons; in the jewelry trade it shares with Providence the bulk of that business east of Newark and New York, containing more than fifty establishments, turning out gilt and gold jewelry, finger-rings, ear-rings, bracelets, lockets, chains, charms, breastpins, etc. Most of these goods are plated, or gilded, and are sold by travelling agents. There are several cotton-mills, running about fifty thousand spindles, also various other manufactories. A. was settled 1669, and its garrison was one of those holding the line of fortifications against the Indians, from Boston to Newport. The town formerly included Cumberland, R. I.; it was called 'North Purchase,' and was incorporated 1694, Oct. 19. A branch railroad connects A. with North A., also with Trenton on the e. Pop. (1880) 11,111; (1890) 7,577.

ATTOCK, *ăt-tŏk':* town and fort of the Punjab, on the left or e. bank of the Indus. The town stands below the fort, a parallelogram of 800 yds. by 400, established by the emperor Akbar, 1581, to defend the passage of the river, but it is no longer a position of strength. The great railway bridge across the Indus here was opened 1883 It has 5 arches 130 ft. high, and renders continuous the railway connection between Calcutta and Peshawur (1600 m.). Pop. 4,210.

The situation of A. is important, whether in a commercial or in a military view. It is at the head of the steamboat navigation of the Indus, being 940 m. from its mouth; while about 2 m. above it, the Cabul river, the only considerable affluent of the Indus from the w., is practicable for vessels of 40 or 50 tons to a distance of 50 m. The valley of this last-mentioned stream, presenting the best approach to the e. and s. from central Asia, has been the route of nearly all but the maritime invaders of India from the days of Alexander the Great downwards. *Taxila*, where the Macedonians crossed the Indus, is supposed to have been the same as Attock.

ATTOLLENT, a. *ăt-tŏl'lĕnt* [L. *ad*, to; *tollen'tem*, lifting or raising]: in *OE.*, raising or lifting up.

ATTORN, v. *ăt-tŭrn'* [OF. *attorner*, to direct, to dispose—from *torner*, *tourner*, to turn: Ital. *attorniare*, to encompass, to enclose; *attorner*, about: L. L. *attornare*, *attorniare*, *atturnare*, to commit business to another, to attorn—from clas. L. *ad*, to; *torno*, to turn in a lathe, to round off—from Gr. *tornus*, a carpenter's tool like our compasses]: to transfer the feudal allegiance of a vassal, or the vassals generally, to a new lord on his obtaining an estate from its former possessor; to profess to become tenant of a new lord. ATTORNING, imp.

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ATTORNEY, n. *ăt-tèr'nĭ*, ATTOR'NEYS, n. plu. [Norm. F. *atourné:* mid. L. *attornātus*, put in the place of any one —from L. *tornārĕ*, to turn, to fashion: OF. *atorné*, directed, arranged for business]: one put in the turn or place of another; one who acts for another, as in a court of law; a lawyer. ATTOR'NEYSHIP, n. the office of an attorney. ATTOR'NEY-GENERAL, in Eng., the head law officer of the crown: in the United States, an official in each state, and in the cabinet at Washington, having charge of the legal business of the governments which they respectively serve; they appear, or serve, in all suits in which their government is a party, and advise in all its legal proceedings and interests. POWER OF LETTER OF ATTORNEY, written authority given to one person empowering him to act for, or to transact certain business for another.

ATTORNEYS or COUNSELLORS-AT-LAW, AND SOLICITORS: legal practitioners who conduct litigation in courts of justice; (in England) preparing the cause for the barristers, whose duty and privilege it is to plead and argue in open court on behalf of the contending parties; in the United States usually both preparing the case in private, and presenting it in court. A. and S. also practice conveyancing, or the preparation of legal deeds and instruments, and they manage much other general business connected with the practice of the law, for which, as well as for the discharge of all their duties, they are mostly remunerated by a fixed and minute scale of charges.

They are called A., as practitioners in the courts of common law, because the attorney is one who is put in the place, stead, or *turn* of another. In former times when prosecuting or defending, suitors were obliged to appear *personally* in court; but now A. may represent. and can often prosecute or defend any action or suit in the absence of, the parties. They are called *Solicitors* in the courts of chancery and equity; and the same name is sometimes given to this profession when transacting family or other general business out of court, and in their own chambers. Solicitor is the term sometimes applied also to the law-officer of a city, etc. A., being admitted by the courts, of which therefore they are officers, have many privileges as such; and they are in consequence peculiarly subject to the control and censure of the judges.

In the United States, A. and S. are officers in a court of justice employed by parties in suits to manage the same before the court. These may either be selected by the parties to the action, or, in case of default in this, may be designated by the court. The eligibility of legal practitioners to hold such positions is decided by local legislation or by the rules of the court. Thus women can act as attorneys-at-law only in the several states when permitted by special statute, but any woman of good standing at the bar of the supreme court of any state or territory or of the Dist. of Columbia for three years, and of good moral character, may become a member of the bar of the supreme court of the U. S.

In the absence of fraud, the client is concluded by the

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acts, and even by the omissions, of his attorney; the duties of the attorney being—to be true to the court and to his client; to manage the business of his client with care, skill, and integrity; to keep his client informed as to the state of his business; to keep his secrets confided to him as such; and he is privileged from disclosing such secrets when called as a witness. For a violation of these duties, an action will, in general, lie, and, in some cases, he may be punished by attachment. Official misconduct may be inquired into in a summary manner, and the name of the offender, on conviction, be stricken from the roll.

ATTOUR, prep. and ad. *ăt-tŏr'* [Fr. *autour*, round about; or Eng. *out*, *over*, pronounced rapidly and indistinctly]: as prep., over; across; beyond; above; further onward than; exceeding in number; past; as adv., moreover.

ATTRACT, v. *ăt-trăkt'* [OF. *attraicter*, to attract—from mid. L. *attractārĕ*, to draw forth—from L. *ad*, to; *tractus*, drawn]: to draw to by some kind of influence; to allure. ATTRACT'ING, imp. ATTRACTED, pp. *ăt-trăk'tĕd*. ATTRAC'TOR, n. one who. ATTRACTABLE, a. *ăt trăk'tă-bl*, that may be attracted. ATTRACT'ABIL'ITY, n. *-bil'ĭ-tĭ*, power of attraction. ATTRACTILE, a. *ăt-trăk'tĭl*, that can attract. ATTRACTION, n. *ăt-trăk'shŭn*, the act of drawing to; that which draws; the power that bodies have of coming together and uniting—*attractions* take place between bodies—*affinities* between the particles of a body. ATTRACTIVE, a. *ăt-trăk'tĭv*, drawing to; alluring. ATTRAC'TIVELY, ad. *-tĭv-lĭ*. ATTRAC'TIVENESS, n. the quality of being attractive or engaging. ATTRACT'INGLY, ad. *-lĭ*. ATTRACTION OF GRAVITATION, that power which acts at all distances throughout the universe. CAPILLARY ATTRACTION, that power which causes liquids to rise in small tubes or porous substances. CHEMICAL ATTRACTION or AFFINITY, the power by which the ultimate particles of bodies of unlike kinds unite themselves together to form a new body possessing new and specific properties. COHESIVE ATTRACTION or ATTRACTION OF COHESION, that power which causes the particles of a body to unite or cohere to form a recognized body, whether aeriform, fluid, or solid.—SYN. of 'attract': to allure; invite; entice; draw; charm; engage.

ATTRACTION: general name for the force or forces by which all bodies, from the minutest particles to the largest planets, suns, and systems of suns, tend to approach, or are *drawn towards* one another, and when in contact, are held together. The term is generic, embracing a vast variety of facts, which are subdivided under five heads or species of A. These are—1. Gravitation; 2. Cohesion; 3. Adhesion, including Capillary A.; 4. Chemical Affinity; 5. The attractions of Electricity, Magnetism, etc. See GRAVITATION: COHESION, etc., as above. Attempts have been made to deduce all these phenomena from one principle of A., modified by an opposing force of repulsion, but as yet without success. Still less can they be explained by assuming only *one* force—A. alone, or repulsion alone—for this, too, has been

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attempted. The idea of an attractive force acting as the bond of the universe was first introduced as a scientific hypothesis by Newton, and was violently combated by Leibnitz and others.

ATTRAHENT, a. *ăt'trā-hĕnt* [L. *attrahen'tem*, drawing to—from *ad*, to; *traho*, I draw]: drawing or attracting.

ATTRECTATION, n. *ăt-trĕk-tā'shŭn* [L. *attrectatio*—from *attrecto*, to touch, to handle—from *ad*, to; *tracto*, to drag about—freq. from *traho*, to draw]: the act of handling frequently; the state of being frequently handled.

ATTRIBUTE, v. *ăt-trĭb'ūt* [F. *attribut*, an attribute—from L. *attrĭbūtus*, given or assigned to—from L. *ad*, to; *trĭbūtus*, granted; bestowed]: to make over to; to give as due; to ascribe to. ATTRIB'UTING, imp. ATTRIBUTED, pp. *ăt-trĭb'ū-tĕd*. ATTRIBUTE, n. *ăt'trĭ būt*, a quality considered as belonging to, or inherent in, any person or thing. ATTRIBUTIVE, a. *ăt-trĭb'ū-tĭv*, pertaining to an attribute: N. in *gram.*, applied to words, as adjectives, which denote an attribute. ATTRIBUTABLE, a. *ăt-trĭb'ū-tă-bl*, that may be ascribed to. AT'TRIBU'TION, n. *-bū'shŭn* [F.—L.]: the act of attributing to; commendation.—SYN. of 'attribute, v.': to ascribe; impute; assign;—of 'attribute, n.': property; quality; symbol.

AT'TRIBUTE, in the Fine Arts: a species of symbol, consisting of a secondary figure or object accompanying the principal figure—as the trident of Neptune, or the owl of Minerva Attributes serve to mark the character meant, and add to the significance of the representation. The necessity of using them lies in the limited means of expression possessed by the formative arts. Attributes may be either essential or conventional. Essential attributes have some real relation or resemblance to the object or idea to be expressed; and are often such as could stand alone as symbols—as the bee, representing diligence. Attributes in the strictest sense, and as distinguished from symbols, are such as are significant only in connection with a figure, to which they in a manner belong; e. g., the wings of genii, the finger on the mouth of Harpocrates. The last is an example of an accidental or conventional A., of which kind are also the *anchor*, to express hope; the *cross*, faith. Common attributes in Christian art are—the harp for King David, and writing materials for the evangelists, especially the apostle John.

AT'TRIBUTE, in Logic: the opposite of *Substance*. The latter is considered as self-existent, while the former can be conceived as possessing only a dependent existence. Attributes are commonly said to belong to substances. Thus, wisdom, holiness, goodness, and truth are termed attributes of God, who is himself regarded as the substance in which they inhere; in like manner, whiteness is called an A. of snow.

ATTRITION, n. *ăt-trĭsh'ŭn* [F. *attrition*—from L. *attrĭtiōnem*—from *attrĭtus*, rubbed or worn away—from L. *ad*, to; *trĭtus*, rubbed]: the act of wearing by rubbing; state

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of being worn by friction; the least measure of sorrow, or lowest degree of repentance, the result of fear—as opposed to *contrition*, the highest degree or real repentance. ATTRITE, a. *ăt-trīt'*, in *OE.*, worn by rubbing; penitent. ATTRITENESS, n. *ăt-trīt'nĕs*, the quality of being rubbed away or worn down by friction.

ATTUNE, v. *ăt-tūn'* [L. *ad*, to, and *tune*]: to put in tune; to make musical; to arrange fitly. ATTUN'ING, imp. ATTUNED, pp. *ăt-tūnd'*.

ATUA, n. *ā'tū-ă*, or AKUA, n. *ā'kū-ă* [Polynesian *Atu*, Master or Lord—primarily, core or kernel]: the chief word for God throughout eastern Polynesia—meaning primarily, 'He who is the very core and life of man.'

ATUN, n. *a-tŭn'*: a fish, the *Thyrsites atun*, belonging to the family of *Trichiuridæ*, or *Hair-tailed* fishes. It feeds voraciously on the calamary, is found in the ocean near s. Africa and Australia, and is prized for the delicacy of its flesh.

ATWAIN, ad. *ă-twān'* [AS. *a*, in, and *twain*]: in *OE.*, in twain: asunder.

ATWEEN, or ATTWEEN, ad. a. prep. *ă-twēn'* [AS. *a*, in; *twegen*, two, twain]: in *prov. Eng.*, in the middle of two things; between; in *Scot.*, occupying a middle position, as 'atween the twa.' ATWO, ad. *ă-tō'*, in *OE.*, into two.

ATWIXT, prep. *a-twikst'* [O. Eng. form of betwixt—from AS. *a*; *tweah*, two]: betwixt.

AT'WOOD'S MACHINE': an instrument for illustrating the relations of time, space, and velocity in the motion of a body falling under the action of gravity. It was invented by George Atwood, or Attwood, a mathematician of some eminence (1745–1807)), educated at Cambridge, who became fellow and tutor of Trinity College in that univ., and published a few treatises on Mechanics and Engineering. It is found that a body, falling freely, passes through 16 ft. in the first second, 64 ft. in the first two seconds, 144 ft. in the first three seconds, and so on. Now, as these spaces are so large, we should require a machine of impracticable size to illustrate the relations just mentioned. The object of Atwood's Machine is to reduce the scale on which gravity acts without in any way altering its essential features as an accelerating force. The machine consists essentially of a pulley, P (see Fig. 1), moving on its axis with very little friction, with a fine silk cord passing over it, sustaining two equal cylindrical weights, *p* and *g*, at its extremities. The pulley rests on a square wooden pillar, graduated on one side in feet and inches, which can be placed in a vertical position by the levelling-screws of the sole on which it stands. Two stages, A and B, slide along the pillar, and can be fixed at any part of it by means of fixing-screws. One of these stages, A, has a circular hole cut into it, so as to allow the cylinder, *p*, to pass freely through it; the other is unbroken, and intercepts the passage of the weight. A series of smaller weights, partly bar-shaped, partly circular, may be placed on the cylinders

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in the way represented in Figs. 2 and 3. A pendulum usually accompanies the machine, to beat seconds of time. The weight of the cylinders, *p* and *g*, being equal, they have no tendency to rise or fall, but are reduced, as it were, to masses without weight. When a bar is placed on *p*, the motion that ensues is due only to the action of gravity upon it, so that the motion of the whole must be considerably slower than that of the bar falling freely. Suppose, for instance, that *p* and *g* are each $7\frac{1}{2}$ ounces in weight, and that the bar is 1 ounce, the force acting on the system—leaving the friction and inertia of the pulley out of account—would be $\frac{1}{16}$ of gravity, or the whole would move only 1 ft. in the first second, instead of 16. If the bar be left free to fall, its weight or moving force would bring its own mass through 16 ft. the first second; but when placed on *p*, this force is exerted not only on the mass of the bar, but on that of *p* and *g*, which is 15 times greater, so that it has altogether 16 times more matter in the second case to move than in the first, and must in consequence, move it 16 times more slowly. By a proper adjustment of weights, the rate of motion may be made as small as we please, or we can reduce the accelerating force to any fraction of gravity. Suppose the weights to be so adjusted that under the moving force of the bar or circular weight the whole moves through 1 inch in the first second, we may institute the following simple experiments: *Experiment* 1.—Place the bar on *p*, and put the two in such a position that the lower surface of the bar shall be horizontally in the same plane as the 0 point of the scale, and fix the stage A at 1 inch. When allowed to descend, the bar will accompany the weight, *p*, during one second and for 1 inch, when it will be arrested by the stage A, after which *p* and *g* will continue to move from the momentum they have acquired in passing through the first inch. Their velocity will now be found to be quite uniform, being 2 inches per second, illustrating the principle that a falling body acquires, at the end of the first second, a velocity per second equal to twice the space it has fallen through. *Exp.* 2.—Take, instead of the bar, the circular weight, place the bottom of *p* in a line with the 0 point, and put the stage B at 64 inches. Since the weight accompanies *p* throughout its fall we have in this experiment the same conditions as in the ordinary fall of a body. When let off, the bottom of

Atwood's Machine.

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the cylinder, *p*, reaches 1 inch in 1 second, 4 inches in 2 seconds, 9 inches in 3 seconds, 16 inches in 4 seconds, 25 inches in 5 seconds, 49 inches in 7 seconds, and 64 inches and the stage in 8 seconds—showing that the spaces described are as the squares of the times. *Exp.* 3. If the bar be placed as in *Exp.* 1, and the stage A be fixed at 4 inches, the bar will accompany the weight, *p*, during two seconds, and the velocity acquired in that time by *p* and *g* will be 4 inches per second, or twice what it was before. In the same manner, if the stage A be placed at 9, 16, 25, etc., inches, the velocities acquired in falling through these spaces would be respectively 6, 8, 10, etc., inches—two inches of velocity being acquired in each second of the fall. From this it is manifest that the force under which bodies fall is a uniformly accelerating force—that is, adds equal increments of velocity in equal times. By means of the bar and the stage A, we are thus enabled to remove the accelerating force from the falling body at any point of its fall, and then question it, as it were, as to the velocity which it has acquired.

ATYA, n. *a-tī'a* [from *Atys:* Gr. *Atus*, the name of several persons mentioned in classic history or mythology. The most notable was an effeminate and foppish youth, killed by Tydeus in the Theban war]: name given by Leach to a genus of decapod long-tailed crustaceans. They have the forceps terminating the four claws cleft as far as its base, or appearing to be composed of two fingers in the form of lashes united at their origin.

ATYPIC, a. *a-tĭp'ĭk* [Gr. *a*, without: L. *typus*—from Gr. *tupos*, a model, a type]: in *nat. sci.*, not having typical characters.

ATYPUS, n. *a-tī'pŭs* [Gr. *a*, without; *tupos*, a type]: genus of spiders belonging to the the family *Mygalidæ*. The *A. Solzeri* excavates in the ground, to the depth of seven or eight inches, a cylindrical tube, which it lines with silk. It is found in France.

AUBAGNE, *ō-bâñ* (anc. *Albania*): town of the dept. of Bouches-du-Rhone, France; on the Huveaune, 9 m. e. from Marseilles, with which it is connected by railway. It is built with some regularity and elegance. The ancient town stood on a hill, at the base of which the present town is situated. It was the cap, of the Albicii, subdued by Julius Cæsar. The castle, once of great strength, is now in ruins. The church was founded 1164. This town is a place of considerable activity, manufacturing pottery tiles, paper, etc. It has tanneries and distilleries. Pop, 5,200.

AUBAINE, n. *ō-bān'* [F. *aubaine*, escheat, right of succession in a sovereign to an alien's goods—from *aubain*, a foreigner]: in France, the right in succession of the sovereign to the goods of a foreigner not naturalized, at his death—abolished 1819; anciently the barbarous right of the sovereign to wrecked vessels and goods, and the power to kill or sell the alien sailors as slaves. See ALBAINS.

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AUBE, *ōb:* river in France; tributary of the Seine, rising near Pralay, on the plateau of Langres; flowing n. w. by Rouvres, La Ferté, Bar, and Arcis; and falling into the Seine at Pont-sur-Seine, after a course of 90 m.

AUBE: a dept. of France, occupying the s. part of the old prov. of Champagne, and a small portion of Burgundy: bounded on the n. by the Marne; e. by the Haute-Marne; s.w. by the Yonne; n.w. by the Seine-et-Marne. The e. part belongs to the basin of the A; the w. to the basin of the Seine. Area, 2,310 sq. m. The climate is mild, moist, and changeable; but on the whole healthful. A great portion of the area is arable land. The n.e. is applied chiefly to pasturage; but the s.e. is far more fertile, rich in meadow-land and forest, and producing grain, hemp, rape, hay, timber, and wine. In minerals the department has little besides limestone, marl, and potters' clay. The chief manufactures are woolen cloth, cotton and linen goods, ribbons and stockings, leather, parchment, etc. The sausages and bacon of A. have long been famous. *Troyes* is the cap. Pop. (1891) 255,548.

AUBENAS, *ōb-nâ':* town in France, dept. of Ardèche; picturesquely situated on the right bank of the Ardèche, 14 m. s.w. from Privas, in the middle of the volcanic region of Vivarais. From a distance its appearance is good, but the streets, with the exception of one traversed by the diligence, are narrow and crooked, the squares small, and the houses very irregularly built. An old and rapidly decaying wall, flanked with towers, girds the town, which contains an ancient castle. A. is the principal mart for the sale of chestnuts and silk in the department. Several important fairs are also held here. It has manufactures of silk, paper, cotton, coarse cloths, leather, etc., the machinery of the mills being driven by water. Pop. (1891) 7,824.

AUBER, *ō-bair'*, DANIEL FRANÇOIS ESPRIT: 1784, Jan. 29—1871, May 14; b. Caen, Normandy: composer of operas. His father was a print-seller in Paris, and sent his son to London to learn the trade. But his irresistible passion was for music, and he soon returned to Paris. Among his earliest compositions may be noticed—the *concertos* for the violoncello, ascribed to Lamare the violoncellist; the concerto for the violin, played by Mazas with great applause at the Conservatory of Music, Paris; and the comic opera, *Julie*, with a modest accompaniment for two violins, two altos, and a bass. These works were very successful; but A., aspiring to greater things, now engaged in a deeper study of music under Cherubini, and wrote a mass for four voices. His next work, the opera *Le Séjour Militaire* (1813), was so coldly received that A. grew disheartened, and resolved to abandon the idea of reaching eminence as a musical composer. However, the death of his father compelled him to be dependent on his own resources; and in 1819 appeared *Le Testament et les Billets-doux*, also unsuccessful; but in *La Bergère Châtelaine* he laid the foundation of his subsequent fame. In

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all these early essays, as well as in the opera of *Emma* (1821), his style was original; but afterwards he became an imitator of Rossini, and disfigured his melodies with false decorations and strivings for effect. All his latter works excepting *La Muette de Portici* (Masaniello), 1828, are written with an assumed mannerism, but in a light and flowing style, with many piquant melodies which have made the tour of Europe and America. The operas *Leicester* (1822), *La Neige* (1823), *Le Concert à la Cour*, and *Léocadie* (1824), *Le Maçon* (1825), *Fiorella* (1826), *La Fiancée* (1829), *Fra Diavolo* (1830), were followed by a series of lighter works: *L'Elixir d'Amour*, *Le Dieu et la Bajadère*, *Les Faux Monnayeurs*, etc.; the later operas, *Gustave ou le Bal Masqué*, *Le Lac des Fées*, *Le Cheval de Bronze*, *Les Diamants de la Couronne*, *La Part du Diable* *La Sirène*, and *Haydée*, exhibiting the same popular qualities as their predecessors; but their interest is evanescent, as they are deficient in depth of thought and feeling. His later works are *Jenny Bell* (1855), and *Manon Lescaut* (1856). In 1842, A. was appointed director of the Conservatory of Music, Paris.

AUBERGE, n. *o-bairzh* [Fr.]: an inn; a place of entertainment for travellers.

AUBERGINES, n. pl. *o-bair-zhēn* [Fr.]: a name for the fruit of two species of solanum.

AUBERVILLIERS, *ō-bĕr-vē-yā'*: village in France; a suburb of Paris. It is notable for a church known as Notre Dame des Virtus, containing a picture of the Virgin which was believed to possess miraculous powers. A little to the east of A. is a fort constructed in 1842. Pop. nearly 20,000.

AUBIGNÉ, MERLE D': see MERLE D'AUBIGNÉ.

AUBIGNÉ, *ō-bēn-yā'*, THEODORE AGRIPPA D': 1550, Feb. 8—1630, Apr. 29; b. near Pons in Saintonge: famous French scholar. He had remarkable talent for the acquisition of languages. Although of noble family, he inherited no wealth, and chose the military profession. In 1567, he distinguished himself by his services to the Protestant cause, and was rewarded by Henry IV., who made him vice-admiral of Guienne and Bretagne. His severe and inflexible character frequently embroiled him with the court; and in 1620 he betook himself to Geneva, where he died. His best-known work is his *Histoire Universelle*, 1550-1601 (Amst. 1616-20), which was burned in France by the common hangman, as also his *Histoire Secrète, écrite par lui-même* (1721). His spirit of biting satire appears in his *Confession Catholique du Sieur de Sancy* and *Adventures du Baron de Foeneste*. His complete works are published in 5 vols. (Par. 1873); and Lives of him by Réaume (Par. 1883), Morillot (Par. 1884), and Von Salis (Heidelb. 1884).

AUBRY DE MONTDIDIER, *ō-bre' dĕh mōn-de-de-ā'*: a French knight in the time of Charles V.; assassinated, as tradition says, in the forest of Bondy by Richard de Macaire, 1371. The latter became suspected of the crime

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on account of the dog belonging to the deceased Aubry invariably showing towards him an unappeasable enmity. Macaire was therefore required by the king to fight with the animal in a judicial combat, which was fatal to the murderer. This tale was afterwards, under the titles of *Aubry's Dog, The Wood of Bondy, The Dog of Montargis*, frequently acted, the 'dog' always gaining the greatest share of applause. After being performed with success at Vienna and Berlin, it was appointed to be played at the Weimar Theatre, of which Goethe was the manager; but the poet resigned his office before the dog made his début.

AUBURN, a. *aw'bérn* [OF. or Sp. *albran*, a wild duck in its first year, having generally a peculiar brown: mid. L. *alburnus*, light colored—from L. *albus*, white]: of a tan or dark color; of a rich chestnut color.

AUBURN, *aw'bern:* flourishing city, cap. of Androscoggin co., Maine; on the Androscoggin river (by which it is separated from Lewiston City), and on the Maine Central R.R., 34 m. n. from Portland. Its principal manufactures are cotton, boots, and shoes. It has two national banks, a court house, six churches, two savings-banks, two newspapers, a furniture factory, a large cotton-mill, foundry, and the Auburn high school. The capital employed in the shoe manufacture is over a million dollars, turning out annually more than four million pairs of shoes, valued at about $3,600,000. Pop. (1876) 6,169; (1890) 11,228.

AUBURN: city, cap. of Cayuga co., N. Y., 25 m. from Syracuse by the New York Central R. R., 2 m. from Owasco Lake, 9 m. from Skaneateles; pleasantly situated on elevated, undulating ground, and has wide thoroughfares lined with shade-trees. Genesee st. is the principal thoroughfare, and contains the handsome county court-house and other prominent public buildings. The most remarkable institution here is the Auburn state prison, whose vast and massive structures stand near the depot, and cover eighteen acres of ground, enclosed by a stone wall 3,000 ft. long and from 12 to 35 ft. high. This prison is conducted on the 'silent system,' and usually contains over 1,000 prisoners employed in mechanical labors.

A. has a Presbyterian theological seminary, founded 1821, an academy, and five public schools. There are 16 churches, 2 national banks (cap. $400,000), 2 savings banks, 2 private banks, 2 opera-houses, 2 daily, 5 weekly, 1 monthly, and 1 quarterly periodicals, and an orphan asylum. On Fort Hill, in the suburbs, is a pleasant cemetery, where lie the remains of William H. Seward, whose home was in A. Owasco Lake, 2 m. from A., is 11 m. long and about a mile wide, surrounded by hills. Here a small steamer plies in summer, and the neighborhood is a favorite summer resort with the citizens of A. The outlet of Owasco Lake runs through the town, furnishing water-power which is utilized by many manufacturing establishments, whose products include cotton and woolen goods, carpets, agricultural implements and other tools, paper, flour, and beer. In 1890 there were 53 manufacturing industries which had 209 estab-

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lishments, $10,832,611 capital, and 6,001 hands; paid $2,472,574 for wages, and $3,519,477 for materials; and received $9,064,093 for products. Pop. (1890) 25,887.

AUBUSSON, *ō-büs-sōn'*: town of the dept. of Creuse, France, 125 m. w. from Lyons; picturesquely situated on the Creuse, in a narrow valley or gorge, surrounded with mountains and rocks. It is well built, consisting chiefly of one broad street. It is celebrated for the manufacture of carpets, said to have been introduced by the Arabs or Saracens, who settled here in the 8th c. Tanning and dyeing are carried on, and there is some trade in wine. Pop. 7,000.

AUBUSSON, *ō-bü-sōn'*, PIERRE D', grand master of the order of St. John of Jerusalem: 1423–1503; b. of an ancient and noble French family. His early history is imperfectly known, but he is said to have borne arms, when very young, against the Turks in the wars in Hungary, and to have distinguished himself by zeal and valor. Here he acquired that intense antipathy to the 'Infidels' which subsequently animated his whole public career, and gave a peculiar bias to his ambition. Having returned to France, he accompanied the dauphin in his expedition against the Swiss. His mind, however, constantly reverted to the ominous encroachments in the East of the dreaded Mussulman, and at last he enrolled himself at Rhodes among the brotherhood of Christian knights, from which time his history emerges into clear light. He swept the Levant, and chastised the pirates who prowled perpetually among the Greek isles. In 1458, he succeeded in forming a kind of Christian league between the French monarch and Ladislaus, King of Hungary, against Mohammed II. He was continually impressed with the necessity of a vast organization of all Christendom to overthrow the power of the Turks. Step by step he won his way to supreme power in his order. In 1476 he was elected grand master. It was a critical period for the civilization and religion of Europe. Constantinople had recently been taken and the Byzantine empire destroyed by Mohammed II. Every day the conqueror marched further west. Thrace, Macedonia, Central Greece, Servia, Wallachia, Bosnia, Negropont, Lesbos, and the islands of the Adriatic had been successively conquered by him. Proud of his rapid success, and sustained by an immense prestige, the sultan threatened to dictate terms from Rome to the entire West. Rhodes, however, stood in his way, the sentinel isle of Christianity, on the great maritime route between Asia and Europe. Mohammed saw that here the battle between the two faiths must be joined; and in 1480, May, a Turkish army of 100,000 men, commanded by a Greek renegade, Palæologos, landed in the island and began the siege of the town. Two desperate assaults were made. The Turks were repulsed, and sailed away, leaving 9,000 dead. Mohammed was enraged, and planned a second expedition, which was interrupted by his death at Nicomedeia, in Asia Minor, 1481, May. After this A. was prominent in the religious diplomacy of the papal court. Meanwhile his exertions to

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improve the internal organization of the brotherhood excited admiration throughout Christendom. At the age of 78 he was appointed generalissimo of the forces of the German emperor, the French king, and the pope against the Turks; and enthusiastically entered on his duties, and sailed to attack Mitylene; but the expedition failed on account of the discordant aims of the various belligerents. Broken by disappointment and vexation, the grand master returned, and died at Rhodes.

AUCH, *ōsh:* cap. of the dept. of Gers, in the s. of France; on the river Gers, 42 m. w. of Toulouse; lat. 43° 38′ n., long. 0° 35′ e. It is the seat of an abp., and has a museum of natural science, with an old and beautiful cathedral, the painted windows of which are greatly admired. Its chief articles of trade are woolen and cotton stuffs, fruits, wine, and brandy.

In ancient times it was called *Elimberis;* and at a somewhat later period took its name from the Auscii, whose chief town it was. In the 8th c., it became the cap. of Gascony; and later, of the county of Armagnac. Pop. (1881) 12,175.

AUCHAN, n. *aw'kan,* or ACHAN, n. *ā'chan* [deriv. uncertain]: a kind of pear.

AUCHENIA, *aw-kē'nĭ-a* [from the Gr. *auchen,* the neck]: genus of ruminating quadrupeds, of which the Llama (q.v.) and the Alpaca (q.v.) are best known. The genus is exclusively S. American; indeed, the species occur only on the lofty ranges of the Andes. They are nearly allied to the camels, and may be regarded as their representatives in the zoology of America. They form, with them, the family *Camelidæ* (see CAMEL), and were included by Linnæus in the genus *Camelus.* They agree with the camels in certain important anatomical characters, particularly in the structure of the stomach; and resemble them very much in general form, in the long neck, small head, prolonged and movable upper lip, and small apertures of the nostrils. They differ from them partly in dentition, and partly in the more cloven feet and movable toes. The nails, also, are stronger and curved, and each toe is supported behind by a pad or cushion of its own; by all which the feet are admirably adapted for the rocky heights which the animals inhabit. The genus A. is by some naturalists called *Llama.*

AUCHTERARDER, *ŏk'tĕr-ar'dĕr:* village in the s.e. of Perthshire, on the w. of the Scottish Central railway. The chief employment is cotton-weaving. The popular opposition to the presentee to the church of A. originated (1839) the struggle which ended in the secession from the Church of Scotland and the formation of the Free Church, 1843. Pop. (1881) 2,666.

AUCK'LAND: the northern provincial dist. of New Zealand, including fully a half of North Island, abt. 400 m. long by 200 wide at its greatest breadth. A. has a coast line of nearly 1,200 m.; and is remarkable for its rivers, which serve as carriage-ways for the produce of the in-

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terior. There are three almost natural divisions of this district: North Peninsula, East Coast, and the Waikato Country—the latter two mainly in the hands of the natives Gold, copper, tin, iron, coal, and other minerals are in A. The value of the gold exported 1857–82 was £4,917,780. A. is very rich in timber, the most important tree being the Kauri pine. The fossil gum found wherever the Kauri forests have been is an important article of export. Much New Zealand flax is grown. In 1881, the total value of the exports was £813,113; including wool, Kauri gum (£253,728), timber, flax, and gold. The imports were valued at £1,490,124. The climate of A. is pleasant and healthful. Volcanic action has deeply left its mark on the surface of A.: there is still an active volcano near the city of Auckland; and the warm lake and geyser scenery of the region is very remarkable. A. is now called strictly, not province, but 'provincial district.' Pop. (1875) 79,104; (1881) 99,451; (1891) 133,267.

AUCK'LAND: second city of New Zealand, on the Hauraki Gulf: till 1865, cap. of New Zealand, when the seat of govt. was transferred to Wellington. A. is distant from Sydney 1,236 m.; from Melbourne, 1,650. Picturesquely situated, its position for commerce is also excellent, as in addition to its harbor at Waitemata it has also a western harbor, the Manakan, 6 m. distant. There is a wharf 1,690 ft. in length. A. is surrounded by numerous thriving villages, with several of which it is connected by railway. It contains a well laid-out botanical garden, and numerous public buildings, government house, barracks, etc. It supports two daily papers. About 230 sailing-vessels and 62 steamers are registered as belonging to A. A. was founded 1840. The temperature appears to be singularly equable. The mean of the coldest month is 51° F., and that of the warmest 68°. The annual rainfall is 45½ inches; and the days of rainfall average 100. Pop. (1891) 28,778; but including suburban districts, 51,127.

AUCKLAND, *awk'land*, BISHOP: town in the middle of the county of Durham; on an eminence, 140 ft. above the plain of the Wear. A. contains the abbey-like palace of the bishop of Durham. Pop. (1881) 10,087.

AUCK'LAND, Earl of, GEORGE EDEN, Gov. Gen. of India: 1784—1849, Jan. 1; son of William Eden, Lord Auckland, whom he succeeded, 1814, as Lord A. He joined Earl Grey's administration, 1833, Nov., and in July following, in Viscount Melbourne's first ministry, he became first lord of the admiralty. He vacated that office in Nov., but was appointed again, 1846. In 1835, he went out to India as gov.-gen., and returned to England, 1841.

AUCK'LAND, Lord, WILLIAM EDEN: 1744—1814, May 28; third son of Sir Robert Eden, Bart., of West Auckland, Durham. He was educated at Eton and Oxford, and called to the bar 1768. In 1772, he was appointed under-sec. of state, and afterwards filled the positions of a lord of trade, a commissioner to treat with the insurgent colonists of North America, chief sec. to the lord

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lieut. of Ireland, minister plenipotentiary to France (concluding a commercial treaty with that country, 1786), ambassador to Spain, ambassador to Holland, and joint-postmaster-gen. In 1788, he was created an Irish peer as Baron A., and in 1793 a British baron. A. was the author of the *Principles of the Penal Law* (1771, 8vo); *Remarks on the Apparent Circumstances of the War* (1795); *Speech on the Income-tax* (1799); *Speech in Support of the Union with Ireland* (1800); and other pamphlets.

AUCK'LAND ISLANDS: group of islands s. of New Zealand, abt. the 51st parallel s., and the 167th meridian e The largest of them measures 30 m. by 15. It has two good harbors, and is covered with the richest vegetation. The Auckland Islands are valuable chiefly as a whaling station, being at the confluence, as it were, of the Pacific and Southern oceans.

AUCTION [from the Latin *auctio*, increasing or enhancement]: a sale conducted in a manner to increase the price of goods by stimulating purchasers. This definition, however, does not apply in the case of what is known as 'Dutch Auction' (properly no auction at all), in which the usual process is reversed, and a price is put by the auctioneer upon the goods offered, which price is reduced till it reaches a sum which some purchaser is willing to give. The word A. and the mode of sale are both of Roman origin, and the system is believed to have been first employed in the disposition of spoils of war, when a spear was stuck into the ground to attract customers, and the sale was said to occur *sub hasta* (under the spear). Auctions are conducted under 'specific conditions of sale,' these being the terms, and, in fact, a portion of the contract between buyer and seller. The fall of the auctioneer's hammer is accepted as concluding the sale, unless some other means are specified in the conditions. These conditions usually accompany the catalogue and description of the article or articles offered for sale; and the descriptions, etc., are obliged by law to be honest, and to describe as faithfully as is practicable the character and condition of the object or right to be disposed of. Conditions which are binding to seller and purchaser alike, are—1st, no attempt shall be made by the seller by means of fictitious offers to enhance the selling price of his goods; 2d, that no combination or conspiracy among purchasers to prevent competition shall be permitted. In the conduct of auctions the exposer or seller may fix an 'upset price' on his goods, or may reserve any portion of them to himself, unless the same be declared to be 'without reserve,' in which case all bidding or reservation in behalf of the seller is barred.

AUCTION, n. *awk'shŭn* [L. *auctiōnem*, increase]: a public sale of any description of property to the highest bidder. AUC'TIONARY, a. *-ĕr-i*, pertaining to. AUCTIONEER, n. *awk'shŭn-ēr'*, one empowered to sell property by auction: V. to dispose of goods by auction. AUC'TIONEER'ING, n.

AUCTIONEER, *awk'shŭn-ēr'*: the person who conducts

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an auction (q.v.). The A. is in a certain sense the agent both of seller and purchaser, and by the fall of his hammer, or by writing the purchaser's name in his book, he binds him to accept the article sold at the price indicated. The A. may also, and frequently does, act as agent for absent purchasers, or for persons who have instructed him to make biddings for them during the sale. In both cases, however, the purchaser must be *bona fide*, otherwise the A. would himself become a 'puffer.' Where the A. declines or omits to disclose the seller's name, he undertakes his responsibilities to the purchasers. To the seller, again, he is responsible for ordinary skill, assiduity, and prudence.

AUCUBA, *aw'kū-ba:* genus of plants of the nat. ord. *Cornaceæ* (q.v.) of which the only known species is *A. Japonica*, an evergreen shrub resembling a laurel, but with dichotomous or verticillate yellow branches, and, as seen in Europe, always with pale green leaves curiously mottled with yellow. It is diœcious, produces its small purple flowers in summer, and ripens its fruit, a small red drupe, in March. It is a native of China and Japan, and is now known to be at least as hardy as the common laurel. It is often called the Variegated Laurel, and is a very common ornamental shrub. The mottled appearance of the leaf is said, however, not to belong to the plant in its ordinary natural state; but only this variety has yet been brought to Europe, and of it only the female plant.

AUDACIOUS, a. *aw-dā'shŭs* [F. *audacieux;* It. *audace*, audacious: F. *audace;* L. *audācĭă*, boldness—from L. *audācem*, bold]: very bold and daring; impudent; forward. AUDA'CIOUSLY, ad. *-lĭ.* AUDACITY, n. *aw-dăs'ĭ-tĭ*, boldness; impudence. AUDA'CIOUSNESS, n. the quality of being audacious.—SYN. of 'audacity': effrontery; hardihood; hardiness; boldness.

AUDÆUS, *aw-dē'ŭs*, AUDI'US (or, according to his native Syriac name, *Udo*): d. abt. 870: founder of a religious sect in Mesopotamia. He commenced by accusing the regular clergy of worldliness, impure morals, etc., and is said to have opposed to their manner of life a strict asceticism. His conduct and his doctrine seemed dangerous to the welfare of the church, and he was excommunicated. His somewhat numerous disciples then clung more closely to him, and he was elected their bishop. In 338, he was banished to Scythia, where he instituted a kind of rival church, and where he died. Modern knowledge of his character and opinions is derived from unfriendly authorities, such as Augustine, Athanasius, etc., therefore to be accepted with caution. But his labors among the fierce barbarians in the north are acknowledged to have been beneficial, and one writer, Epiphanius, states that he ought to be considered *schismatical*, but not *heretical*. But if the leading feature of his system was, as is alleged, a decided tendency to anthropomorphism, it does not appear—according to the principles upon which the church usually proceeded—why he should not have been called a heretic. He is said to have

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held that the language of the Old Testament justifies the belief that God has a sensible form—a doctrine deemed heretical in all ages of the church's history. This particular tenet took firm hold on many minds, and in the subsequent century was widely spread through monasteries of Egypt. AUDÆ'ANISM, or AUDI'ANISM, the doctrine of A. AUDÆ'ANS, followers of Audæus.

AUDE, *ōd* (*Atax*): river in the s. of France; rises in the e. Pyrenees, not far from Mont Louis; flows for some time parallel to the canal of Languedoc; and falls into the Mediterranean 6 m. e.n.e. of Narbonne, after a course of more than 120 m.

AUDE: maritime dept. in the s of France. It comprises some old 'counties' formerly a portion of the province of Languedoc: 2,430 sq. m. The s. part of A. is mountainous, but the greater portion of it belongs to the valley of the lower A. and the canal of Languedoc. Its n. boundary is formed by the Black Mountains, the most southerly offsets of the Cevennes. The coast is flat, with no bays or roadsteads, but several lagunes. The climate is warm, but variable. The mountains are composed of granite, while the soil of the plains is chiefly calcareous, and near the coast—where salt and soda are procured—is extremely fertile, producing cereals, olives, fruits, and wines. A. is rich in iron and coal, and mineral springs. The woolen and silk manufactures are of considerable value. There is considerable export of corn, honey, etc. Chief town, Carcassonne. Pop. of A. (1881) 327,942; (1886) 332,080; (1891) 317,372.

AUDEBERT, *ōd·bair'*, JEAN BAPTISTE: distinguished French naturalist; 1759–1800; b. Rochefort; studied the arts of design and painting at Paris; and in early life gained eminence as a miniature-painter. Having been much employed by naturalists in painting the more rare and beautiful objects in their collections, he published on his own account (Paris, 1800) a splendid volume, which raised him at once to celebrity, both as painter and author. This work, the *Historie Naturelle des Singes, des Makis, et des Galéopithèques* (Natural History of Monkeys, Lemurs, and Flying Lemurs), was a large folio, with 62 colored plates, remarkable for truth and beauty. His method of color-printing in oil, then novel but now common, was to dispose all the colors on one plate instead of using a separate plate for each color. His use of gold and bronze in the illustrations and letterpress was also new. In his *Histoire des Colibris, des Oiseaux-mouches, des Jacamars et des Promérops* (Natural History of Humming birds, Jacamars, and Promeropses), he gave his plates even greater brilliancy and finish.

AUDIBLE, a. *aw'dĭ-bl* [mid. L. *audib'ĭlis*, that may be easily heard—from L. *audĭō*, I hear: It. *audible*, audible]: that may be heard; loud enough to be perceived by the ear. AU'DIBLY, ad. *-blĭ*, in a manner to be heard. AUDIBLENESS, n. *aw'dĭ-bl-nĕs*, the quality of being audible. AU'DIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the being loud enough to be heard. AUDIENCE, n. *aw'dĭ-ĕns* [F.—L. *audĭén'tĭă*, hearing]: admittance to a hearing; an interview; an assembly of hearers. AU'-

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DIENCE CHAMBER, n. *chām'bĕr*, a chamber in which audiences are granted. AU'DIENCE COURT, n. *cōrt*, a court belonging to the Abp. of Canterbury. Being accustomed formerly to hear causes extra-judicially in his own palace, he usually requested that difficult points should be discussed by men learned in the law, called *auditors*, whence ultimately sprang up by degrees a court held to have equal authority with that of Arches, though inferior to it both in dignity and antiquity. The audience court is now merged in the Court of Arches, the duties of its former presiding officer being discharged by the Dean of the Arches.

AUDIOMETER, n. *aw-dĭ-ŏm'ĕt-ĕr*, or AUDIMETER, n. *aw-dĭm'ĕt-ĕr* [L. *audio*, I hear; Gr. *metron*, measure]: an instrument devised by Prof. Hughes, the inventor of the microphone, and described by Dr. Richardson at a meeting of the Royal Soc., 1879. Its object is to measure with precision the sense of hearing. Among its constituent parts are an induction coil, a microphone key, and a telephone.

AUDIPHONE, *aw'dĭ-fōn*: an invention by Mr. Rhodes of Chicago, to assist the hearing of deaf persons in whom the auditory nerve is not entirely destroyed. The instrument, made of a thin sheet of ebonite rubber or hard vulcanite, is about the size of a palm-leaf fan, with a handle and strings attached to bend it into a curving form, and a small clamp for fixing the string at the handles. The A. is pressed by the deaf person using it against his upper front teeth, with the convex side outwards; when so placed it communicates the vibrations caused by musical sounds or articulate speech to the teeth and bones of the skull, thence to the organs of hearing. For different sounds, it requires to be focused to different degrees of convexity. A simple strip of fine glazed mill-board has been recommended by some experimenters as cheaper and equally serviceable; and birch-wood veneer has been used with success for the same purpose.

AUDIT, n. *aw'dĭt* [L. *audit*, he hears; *audītum*, a hearing, a report—from *audĭō*, I hear]: an examination of accounts by a person or persons appointed for the purpose, in order to ascertain whether they be correct; final account: V. to examine and settle as to the correctness of accounts. AU'DITING, imp. AUDITED, pp. *aw'dĭ-tĕd*. AU'DITOR, n. *-dĭ-tĕr*, a hearer; an officer appointed to examine accounts, in behalf either of the government, of courts of law, of corporations, or of private persons. AU'DITORSHIP, n. the office of an auditor. AUDITORY, n. *aw'dĭ-tĕr-ĭ*, an assembly of hearers: ADJ. able to hear; pertaining to the sense of hearing. AUDITORIUM, n. *aw-dĭ-tō'rĭ-ŭm* [L. *auditorium*, a lecture-room, a hall of justice]: in ancient churches, the nave; that part of a theatre or public building in which the audience sit. AUDIT HOUSE, n. a house appendant to most cathedrals, and designed for the transaction of business connected with them.

AUDITA QUERELA, used as n. *aw-dĭ'ta kwĕ-rē'la* [L.—*lit.* a heard complaint, or a complaint having been

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heard]: in *law*, a writ now rarely used, which stayed judgments, and gave the person against whom it had gone forth a rehearing on the ground that he had a good defense, but that by the forms of law he had no opportunity of making it.

AU'DITORY NERVE, in Anat.: the nerve associated with the facial; seventh nerve in order of origin from the brain, counting from the front backwards. The seventh pair consists of the portio dura or facial, the portio mollis or auditory, and a small intermediate portion. The portio mollis apparently commences by some white streaks in the floor of the fourth ventricle; it then runs forward to the back of the petrous portion of the temporal bone, and enters the internal auditory meatus. The facial then leaves it to pass along the canal called the Aqueductus Fallopii, and the auditory divides into two portions, which diverge—the smaller one posterior for the semicircular canals and the vestibule, the other for the cochlea. Those entering the semicircular canals divide into five branches, forming at last a nervous expansion somewhat analogous to the retina. Figs. 1 and 2 represent the Auditory Nerve (1) dividing into its two portions, the lesser branch supplying the semicircular canals (2), the larger branch supplying the cochlea (3). Fig. 1 represents the semicircular canals of the left side, with their bony rings round the

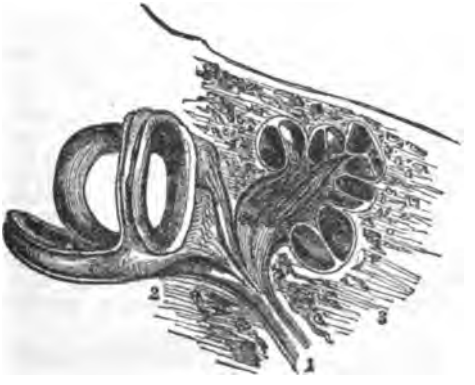

Fig. 1.—Left Auditory Nerve.

membranous labyrinth. In this figure, the cochlea is cut in half, longitudinally from base to apex, showing a section of the spiral canal, with the nerve proceeding up through its axis. Fig. 2 represents the membranous labyrinth (2), with the bony framework cut away, and with the cochlea opened so as to show the manner in which the nerve spreads out in the spiral lamina.

Several theories have been held at different periods with regard to the manner in which the nerves terminate in the cochlea, and how sound is transmitted from the latter to

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the brain. The latest and most widely accepted is that of M. Schultze. It has been shown by experiment, that when a nerve in connection with a muscle is acted upon by a succession of very rapid strokes from the little hammer of

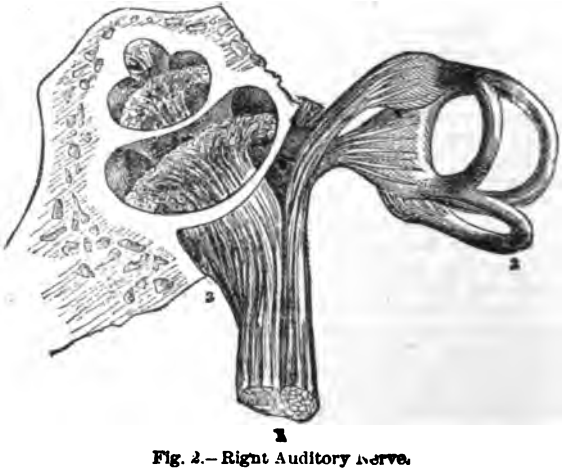

Fig. 2.—Right Auditory Nerve.

a tetanmotor, and when the strokes have arrived at a certain number in the second, a stimulus is sent along the nerve exciting the muscle to action. It is in the same way that M. Schultze supposes the impression of sound to be propagated to the nerves of the cochlea, by means of a series of little tetanmotors called the teeth of Corti, who discovered them. They are situated in the spiral lamina, which separates the spiral canal in the interior of the cochlea into an upper and a lower half or scala. The spiral lamina consists of an osseous septum, next to the central axis of the cochlea, and of a membranous layer which prolongs the osseous septum to the outer wall of the cochlea, thus completing the spiral lamina. This membranous septum is double, and between its layers there is

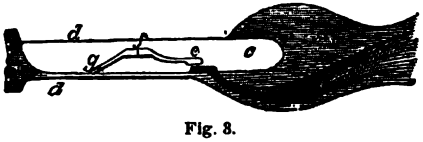

Fig. 3.

a, the osseous septum grooved for the passage of the cochlear nerve, *b*, which terminates by a free end inside the chamber, *c*, along the floor of which it lies for a short distance; *d*, *d* are the two layers of the membranous septum. Lying in contact with the end of the nerve is the enlarged extremity of a rod, *e*, which is connected in a flail-like manner by the hinge, *f*, to another rod, which is fixed at *g*.

a chamber which contains the teeth of Corti, ranged side by side throughout the whole length of the spiral lamina,

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and gradually growing shorter from base to apex, like the strings of a harp or pianoforte. The chamber is filled up by a tremulous jelly-like fluid. The diagram, Fig. 3, represents a perpendicular section of the spiral lamina. The fluids of the ear receive vibrations for the nerve-endings. The harp-like rods of Corti are supposed to give pitch of sound. When the semicircular canals are cut, the animal becomes dizzy. Dizziness implies loss of our sense of level and direction—functions of the canals.

AUDLEY, *awd'lĭ*, Sir JAMES: d. 1369: one of the original knights of the Order of the Garter, founded 1344 by Edward III., on his return from France after the victory of Cressy. A. accompanied Edward the Black Prince to France, 1346. He was so conspicuously brave at the battle of Poictiers, that the prince retained him as his own knight, and declared him the bravest soldier on his side. He conferred on him an annual revenue of 500 marks, which A. immediately gave up to his squires. This act of disinterestedness became known, and the Black Prince conferred a further annual sum of 600 marks upon him. A. also accompanied the Black Prince into Spain, and in 1369 the office of seneschal of Poitou was conferred upon him. He took part in the capture of La-Roche-sur-Yon in Poitou, in the same year, and died a few months afterwards.

AUDRAN, *ō-drŏn'*, GÉRARD: one of the most celebrated engravers of the French school: 1640–1703; b. Lyons; of a family distinguished in this department of art. After three years' residence at Rome, where he studied under Carlo Maratti, and won high repute by his engraving of Pope Clement IX., he was recalled to France by Colbert, and appointed engraver to his majesty Louis XIV. Here he engraved the principal works of Lebrun, with whom he lived in closest friendship. His masterpieces are a series of engravings illustrating the battles of Alexander. He died at Paris.

AUDUBON, *aw'du-bŭn*, JOHN JAMES: distinguished American ornithologist; 1780, May—1851, Jan. 27; b. Lou., of French parentage. Under his father's guidance, the youth conceived a passion for the study of birds; and a book of ornithological specimens determined him to become a draughtsman. About the age of fourteen, he went to Paris, and studied under the celebrated David. In 1798, he was settled on a farm in Pennsylvania by his father, but he did not distinguish himself as an agriculturist. In 1810, he sailed down the Ohio, with his wife and child, on a bird-sketching expedition. The following year, he visited Florida for a like purpose; and for many years he continued his ornithological researches among the American woods, to the neglect of his ordinary business. The latter he finally abandoned; and in 1824 he went to Philadelphia, where he was introduced to Prince Charles Lucien Bonaparte, who so warmly encouraged him in his plans that he determined on publication. After two years' further exploration of the forests of his native country, he came to Europe with the view to secure subscribers for

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his work on *The Birds of America*. He met with a warm reception from such men as Herschel, Cuvier, Humboldt, Brewster, Wilson, and Sir Walter Scott. The issue of his work was soon commenced, each bird being delineated life-size. The colored engravings were executed chiefly by the late Mr. W. H. Lizars of Edinburgh. The work was completed in 87 parts, elephant folio, containing 448 plates. While the work was in process of publication abroad (it was finished 1839), A. visited America three times, for further researches. In 1831, he began the publication of his *American Ornithological Biography* in Edinburgh, also finished 1839. In 1839, A. finally returned to America, where, in 1844, he published a reduced edition of his works. Assisted by Dr. Buchanan, he published also *The Quadrupeds of America*, and a *Biography of American Quadrupeds*.

AUER, *ow'ér*, ALOIS: 1813, May 11—1869, July 10; b. at Wels, Upper Austria; trained in a printing establishment of his native town to be a compositor, corrector, and manager. During his few leisure moments, A. gained a knowledge of French, Italian, English, and other languages, in which he underwent an examination in 1835 and '36, before the Univ. of Vienna. His brilliant appearance on this occasion opened the way to the chair of Italian in the college at Linz. After travels in Germany, France, and England, he became director of the imperial state-press at Vienna, and in 1860 he was made a knight. He published a work showing the Lord's Prayer in 603 languages; a *Grammatical Atlas*, etc.; and in *Die Entdeckung des Naturselbstdrucks* (1864), he expounded his discovery of NATURE-PRINTING (q.v.). He also made improvements in typographical and mechanical processes.

AUERBACH, *ow'ér-bâk*, BERTHOLD: popular German author, of Jewish extraction: 1812, Feb. 28—1882, Feb. 8; b. at Nordstetten, in the Würtemberg Black Forest. He studied at Carlsruhe, Stuttgart, Tübingen, Munich, and Heidelberg. He early abandoned the study of Jewish theology and turned to literature; and is regarded by many as the greatest German writer of fiction. His first publication was on the relation of *Judaism and Modern Literature* (1836). His first novel, *Spinoza*, contained many suggestive philosophical thoughts, and bright sketches of Jewish life; it was followed by a translation of the works of Spinoza (5 vols. Stuttg. 1841). In the *Village Tales* (*Schwarzwälder Dorfgeschichten*, 1843) he showed his power in the charming portraiture of German peasant life; a second series appeared in 1848. *Auf der Höhe* (1865) has been pronounced the bets novel in the German tongue. The *Village Tales* were translated into English, Swedish, and Dutch, and were generally admired. Among his works are *Schrift und Volk* (1846); *Das Landhaus am Rhein* (1869); *Wieder unser; Gedenkblätter zur Geschichte dieser Tage* (1871): *Waldfried* (1874). *Brigitta*, published in 1830, dealt with peasant-life in the style of his best village tales.

AUF, n.: see OAF, a silly fellow.

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AU FAIT, a. *ō fā'* [F., in fact, indeed, in reality]: acquainted with; skilled in.

AUGEAN STABLE, n. *aw-jē'ăn stā'bl:* in Grecian Myth.: a stable belonging to *Augĕas*, or *Augeias*, son of Helios and Iphiboë (or Phorbas and Hermione) Augeas was king of Elis, and renowned for his wealth in oxen, of which he fed 3,000 head in his stables. After many years, in which these stables had never been cleaned, Hercules was commissioned by Eurystheus to cleanse them in one day, and was promised as payment a tenth part of the oxen. Hercules accomplished the task, by turning the courses of the rivers Peneus and Alpheus through the masses of ordure. When A. refused to pay the stipulated wages a war ensued, and A. was slain by Hercules Cleansing the A. stable is the type of a needed, but nearly impossible, reform.

AUGELITE, n. *aw'jĕl-īt* [Ger. *augelith*—from Gr. *augē*, bright light, radiance; suffix *ite*]: a colorless or pale-red mineral, with its lustre strongly pearly on cleavage surfaces. The composition is: phosphoric acid, 35·3; alumina, 49·15; water, 12·85, with some lime, iron, etc.

AUGER, n. *aw'gĕr* [AS. *naf-gar*—from *nafa*, the nave of a wheel; *gár*, a piercer: Fin. *napa*, a navel, the middle of a thing]: an iron tool for boring holes.

AUGEREAU, *ōzh-rō'*, PIERRE FRANÇOIS CHARLES, Duke of Castiglione, Marshal and Peer of France, one of the most brilliant and intrepid of that band of general officers whom Napoleon gathered around himself: 1757, Oct. 21—1816, June 11; son of a tradesman. At the age of seventeen, he enlisted in the French carabiniers; afterwards was in the Neapolitan service till 1787, when he settled in Naples as a fencing-master. With other French residents, he was banished from that city in 1792, and immediately volunteered into the French revolutionary army intended for the repulsion of the Spaniards. His services were so conspicuous, that in less than three years he was made general of a division. In 1795, he accompanied the army to Italy, where he greatly distinguished himself, especially in the field, but also in council. He gained much glory in the battles of Millesimo, Ceva, Lodi, Castiglione (for which he received his title), Roveredo, Bassano, etc. In 1797, he was appointed to command the Army of the Rhine; but a few months later he was transferred to be commander of the tenth division at Perpignan. This post he resigned in 1799, when he was elected as deputy in the council of the Five Hundred. In 1801, he received the command of the army in Holland; in 1804, he was made a marshal; in 1805, he commanded a division of the army which reduced the Vorarlberg; afterwards he was engaged at Wetzlar, Jena, Eylau; also in Italy (1809); Spain (1810); Berlin, Bavaria, and Saxony (1813).

AUGER-SHELL, n. *aw'gĕr-shĕl:* the English name of the shells belonging to the genus Terebra. It is given in consequence of their being long and pointed.

AUGHT, or OUGHT, n. *awt* [AS. *â-wiht;* Goth. *waihts*, a thing]: anything; a tittle or jot.

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AUGIER, *ō'zhe-ā'*, GUILLAUME VICTOR EMILE: French dramatist; b. Valence, 1820, Sept. 17; educated for the profession of an advocate, but soon turned to literature, especially the drama. In 1844, he composed a piece in two acts, and in verse, entitled *La Ciguë*, which he offered to the Théâtre Français, but without success. The Odéon, however, received it, and it was played at that theatre with considerable applause for nearly three months. This is said to be the best of A.'s works, containing moral lessons, set in a framework of the antique, and made attractive by elegant versification. In the following year, the Théâtre Français sought his services, and he produced for that theatre his second comedy, entitled *Un Homme de Bien*, in three acts, and in verse—a comedy of the day, only partially successful. A third, *L'Aventurière*, 1848, was better received, but was thought too full of common-place moralizing. *Gabrielle*, 1849, also highly moral, gained for its author the Monthyon prize. In 1852, he wrote *Diane;* in 1853, *La Pierre de Touche* (with Jules Sandeau); also *Philiberte*. After this time, his pieces belong to the comedy of intrigue. Such are *Le Mariage d'Olympe; Le Gendre de M. Poirier*, written in partnership with Jules Sandeau; and *La Revanche de Georges Dandin*—all produced 1855; *La Jeunesse*, in 1858; *Les Lionnes Pauvres*, in the same year, written in conjunction with E. Foussier; and the *Beau Mariage*, also in conjunction with Foussier, in 1859. Either singly or with others, A. has also written *Les Effrontés*, *Le Fils de Giboyer*, *Maître Guérin*, *La Contagion*, *La Chasse au Roman*, *L'Habit Vert*, *Paul Forestier*, and *Sapho*—the last an opera, music by Gounod. In 1856, he published a small vol. of *Poésies*. Usually, A. is regarded as one of the leaders of the school of good sense; in his later pieces, however, approaching too much to the manner of the younger Dumas. In 1858, he was elected a member of the Académie Française, and was made a commander in the *Legion d'Honneur*, 1868. D. 1889, Oct. 25.

AUGITE, n. *aw'jīt* [Gr. *au'gē*, brightness]: aluminous var. of PYROXENE, a mineral very nearly allied to hornblende (q.v.), which has, indeed, by some mineralogists been regarded as a variety of it, though the distinction between them is important, as characterizing two distinct series of igneous rocks. AUGITIC, a. *aw-jīt'ĭk*, pertaining to.

Augite consists of 47–56 per cent. of silica, 20–25 per cent. of lime, and 12–19 per cent. of magnesia, the magnesia sometimes giving place in whole or in part to protoxide of iron, and the varieties containing 2–15 alumina; some have a little soda or potassa, etc. Its specific gravity is 2·935–3·434. It is little or not at all affected by acids. It is usually of a greenish color, often nearly black. It crystallizes in six or eight-sided prisms, variously modified; it often occurs in crystals, sometimes imbedded, often in grains or scales. It is an essential component of many igneous rocks, particularly of basalt (q.v.), dolerite, and A.-porphyry (see PORPHYRY), from which chiefly it derives its importance as a mineral species. Augite Rock, consisting essentially of A. alone, occurs in the Pyrenees. A. is a common mineral in

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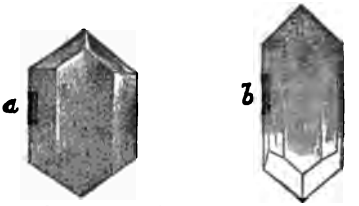
trap-rocks. It is rarely associated with quartz, in which respect it differs from hornblende, but very often with labradorite, olivine, and leucite. Fluorine, generally present in small quantity in hornblende, has never been detected in A.



a, Common Augite; *b*, Green Augite.

The form of the crystals also is different in the two minerals, as well as their cleavage; but Prof. Gustav Rose of Berlin has endeavored to show that the difference between A. and hornblende arises only from the different circumstances in which crystallization has taken place, and that A. is the production of a comparatively rapid, and hornblende of a comparatively slow, cooling. He regards some of the varieties as intermediate. His views have been supported by experiments, and by a comparison of A. with certain crystalline substances among the scoriæ of foundries.—*Diopside*, *Sahlite*, and *Coccolite* are varieties of Pyroxene; also Diallage (q.v.), Hedenbergite, and other minerals.

AUGMENT, v. *awg-mĕnt'* [L. *augmen'tum*, an increase: F. *augmenter*, to increase—from L. *augĕō*, I increase]: to increase; to make or become large in size or extent. AUGMENT, n. *awg'mĕnt*, an increase; a prefix. AUGMENT'ING, imp. AUGMENT'ED, pp. AUGMENTABLE, a. *awg-mĕnt'ă-bl*, that may be increased. AUG'MENTA'TION, n. *-tā'shŭn*, an increase; the act of enlarging. AUGMEN'TATIVE, a. *-tă-tĭv*, having the power to augment: N. in *gram.*, opposite of diminutive. AUGMEN'TER, n. one who.—SYN. of 'augment, n.': increase; accession; augmentation; addition.

AUGMENTA'TION, in Heraldry: see HERALDRY.

AUGMENTA'TION, in Music: reproduction of a melody, or principal subject of a composition in the course of the progress of the piece, in notes of greater length than those notes in which the melody is first introduced. The tempo remains unaltered. A. is of great importance in the treatment of the subjects, or themes, for fugues, and properly used produces great effects.

AUGMENTA'TION, PROCESS OF, in Scotch Law: an action in the Court of Teinds (q.v.) by the minister of a parish against the titular, or beneficiary, and heritors, for the purpose of procuring an increase to his stipend.

AUGMENTA'TION COURT: court erected by King Henry VIII. for the increase of the revenues of his crown, by the suppression of monasteries.

AUGSBURG, *awgs'bôrg*: historically one of the most notable cities in Germany; in the angle between the rivers

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Wertach and Lech; chief city of the circle of Swabia and Neuburg, in Bavaria. Though of an antique and rather deserted appearance, A. has numerous fine buildings, and especially one noble street, the 'imperial' Maximilian Strasse, adorned with bronze fountains. The industry of A. is reviving; several cotton and woolen factories are in operation, as well as manufactories of paper, tobacco, and machinery. Its gold and silver wares retain their ancient reputation. The art of copper engraving is extinct; but printing, lithography, and bookselling have taken a new start. The *Allgemeine Zeitung*, the best known of the German newspapers, was published here till 1882 (now at Munich). There are in A. ten printing establishments, many bookshops, and more breweries. Banking and stock-jobbing are extensively carried on; and it is still the emporium of the trade with Italy and s. Germany. It is the centre of a system of railways connecting it with Nürnberg and Leipsic, with Switzerland, Munich, etc. The foundation of A. was the 'colony' planted by the emperor Augustus, B.C. 12, after the conquest of the Vindelici, probably on the site of a former residence of that people. It was called *Augusta Vindelicorum*, whence the present name. It became the cap. of the province of Rhætia, was laid waste by the Huns in the 5th c., and came next under the dominion of the Frankish kings. In the war of Charlemagne with Thassilo of Bavaria it was again destroyed. After the division of Charlemagne's empire, it came under the Duke of Swabia; but, enriched by commerce, was able to purchase gradually many privileges, and became, 1276, a free city of the empire. It reached the summit of its prosperity by the end of the 14th c. About 1368 its aristocratic government was set aside for a democratic, which lasted for 170 years, till the aristocracy, favored by Charles V., regained the ascendancy. A. continued in great eminence for its commerce, manufactures, and art, till the war between Charles V. and the Protestant League of Schmalkald (1540). With Nürnberg, it formed the emporium of the trade between n. Europe and the south, and its merchants were princes whose ships were in all seas. See FUGGER. It was also the centre of German art, as represented by the Holbeins, Burkmair, Altdorfer, and others. Many diets of the empire were held in A., and the leading events of the Reformation are associated with its name. The discovery of the road to India by the Cape, and of America, turned the commerce of the world into new channels, and dried up the sources of A.'s prosperity. It lost its freedom with the abolition of the German empire in 1806, and was taken possession of by Bavaria. Pop. (1880) 61,408; (1895) 80,798.

AUGSBURG CONFESSION: the chief standard of faith in the Lutheran Church. Its history is the following: With a view to an amicable arrangement of the religious split that had existed in Germany since 1517, Charles V., as protector of the church, had convoked a diet of the empire, to meet at Augsburg, 1530, April 8, and had required from the Protestants a short statement of the

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doctrines in which they departed from the Rom. Cath. Church. The Elector John of Saxony, therefore, in March, called on his Wittenberg theologians, with Luther at their head, to draw up articles of faith, to lay before him at Torgau. The commissioned doctors took as a basis, as far as pure doctrine was concerned, articles that had been agreed to the previous year at conferences held at Marburg and Schwabach, in the form of resolutions of the Lutheran reformers of Germany against the doctrines of Zwingli. These doctrinal articles with a supplement, and with a practical part added, were laid before the elector at Torgau. Melanchthon then, taking the Torgau articles as a foundation, with the advice of various Protestant theologians, as well as princes and other secular authorities, composed the document, which he first called an Apology, but which in the diet itself took the name of the Augsburg Confession. This work was begun at Augsburg in May. Luther was not present in Augsburg, being then under the ban of the empire, but his advice was had recourse to in its composition. The Torgau articles were in German; the Confession was both in German and Latin; and Melanchthon labored incessantly at its improvement till it was presented to the emperor, June 25. The character of Melanchthon, in the absence of Luther, had led him, in setting about the composition of the document, to aim at maintaining a spirit of love, forbearance, and mediation, as well as the utmost brevity and simplicity. Its object, which became gradually apparent only after the meeting of the diet, was, in the first place, to give a collected view of the belief of the Lutheran Protestants, aiming at the same time at refuting the calumnies of the Rom. Catholics, and at laying a foundation for measures of reconciliation.

The first part of the Confession contains 21 articles of faith and doctrine: 1. Of God; 2. Of Original Sin; 3. Of the Son of God; 4. Of Justification; 5. Of Preaching; 6. Of New Obedience; 7 and 8. Of the Church; 9. Of Baptism; 10. Of the Lord's Supper; 11. Of Confession; 12. Of Penance; 13. Of the Use of Sacraments; 14. Of Church Government; 15. Of Church Order; 16. Of Secular Government; 17. Of Christ's Second Coming to Judgment; 18. Of Free Will; 19. Of the Cause of Sin; 20. Of Faith and Good Works; 21. Of the Worship of Saints. The second and more practical part, with discussion at greater length, contains seven articles on disputed points: 22. On the Two Kinds of the Sacrament; 23. Of the Marriage of Priests; 24. Of the Mass; 25. Of Confession; 26. Of Distinctions of Meat; 27. Of Conventual Vows; 28. Of the Authority of Bishops.

This document, signed by some six Protestant princes and two free cities, was read before the emperor and the diet, 1530, June 25. Melanchthon, not looking upon the Confession as binding, began soon afterwards to make some alterations in its expression; at last, in 1540, he published a Latin Edition (*Confessio Variata*) in which there were important changes and additions. This was especially the case with the article on the Lord's Supper, in which, with a view

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to conciliation, he endeavored to unite the views of the Lutherans and Calvinists. This gave rise to much controversy; orthodox Lutheranism repudiated the alterations of Melanchthon, and long continued to subject his memory to great abuse; though it is clear that Melanchthon and his adherents contemplated no substantial departure in doctrine from the original Confession. It is not certain that the form of the Confession found in the Lutheran standards is identical with the unaltered Augsburg Confession, as the two original documents—German and Latin—laid before the diet have been lost. The chief distinction between the orthodox Lutherans and the reformed churches of Germany has all along been adherence to the 'unaltered' or to the 'altered' Confession. It was even a matter of controversy whether the 'reformed' were entitled to the rights secured to the Protestants by the Religious Peace of Augsburg, concluded 1555, on the ground of the 'unaltered' Confession.—Though the Augsburg Confession is still formally adhered to by the Protestant churches of Germany, it is confessedly no longer the expression of the belief of the vast majority of the members, after the great advances made by theology, and the many alterations in public opinion and feeling.

AUGS'BURG IN'TERIM: see INTERIM.

AUGUR, n. *aw'gĕr* [L. *augur*, an augur—probably from *avis*, a bird; and *gur*, telling—from *garriō*, I talk idly]: among the anc. Romans, one who professed to tell future events by natural tokens, as the singing and flying of birds, and the flashing of lightning; a soothsayer: V. to profess to foretell events; to guess; to be a sign. AU'GURING, imp.: ADJ. engaged on conjectures; foreboding: N. the imaginary interpretations of signs. AUGURED, pp. *aw'gĕrd*. AU'GURSHIP, n. the office or dignity. AUGURAL, a. *aw'gū-rŭl*, or AUGU'RIAL, *-rĭ-ăl*, pertaining to. AUGUROUS, a. *aw'gū-rŭs*, foreboding; predicting. AUGURATE, v. *aw'gū-rāt*, to predict. AU'GURA'TING, imp. AU'GURA'TED, pp. AUGURY, n. *aw'gū-rĭ*, or AUGURATION, n. *aw-gŭr-ā'shŭn*, the art of foretelling events by the flights of birds; an omen or prediction. AUGURIST, n. *aw'gŭr-ĭst*, one who practices augury; an augur.—SYN. of 'augur, v.': to presage; foreboding; betoken; prognosticate; portend; predict.

AU'GURIES and AU'SPICES: omens of future events The entire religious and political life of the early Romans was deeply penetrated by the influence of their superstitions, among which auguries and auspices held a prominent place.

Like almost all primitive nations, the Romans believed that every unusual occurrence had a supernatural significance, and contained, hidden in it, the will of Heaven regarding men. To reveal or interpret this hidden will was the exclusive privilege of the augur, who apparently derived his official designation, in part at least, from *avis*, a bird; while Roman history abundantly proves that the observation of the flight of birds was the principal means adopted for discovering the purpose of the gods. It was not, however, any one who could be appointed an augur. The gods selected their own interpreters—that is to say,

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they conferred the divine gift upon them from their very birth; but an educational discipline also was considered necessary; hence a 'college of augurs' figures in the very dawn of Roman history. Romulus, it is almost certain, was an augur. He is said to have been skilled in the art of divination from his youth; and by 'divination' we must specially understand augury; for the Romans, with patriotic piety, held all the forms of divination practiced in other countries to be useless and profane. Previous to the Ogulnian law, passed B.C. 307, there were only four augurs, selected from the patricians. By this law, however, the plebeians became eligible for the pontificial or augural offices, and five were immediately created. For more than two hundred years, the number continued the same, till Sulla, B.C. 81, increased it to fifteen. Finally, in the first days of the empire, when all parties, tired of the long civil wars, hurried to throw their privileges at the feet of the monarch who had brought peace into their homes, the right of electing augurs at his pleasure was conferred on Augustus, after which the number became indefinite.

At first, the augurs were elected by the *Comitia Curiata;* but as the sanction of the former was necessary to give validity to the acts of the latter, they could always 'veto' any elections which were obnoxious to them; so that the power of electing members to fill up vacancies naturally fell into the hands of the college itself, and so continued till B.C. 103, when a tribune of the people named Ahenobarbus carried a law by which it was enacted that for the future vacancies in the augural and pontifical offices should be filled not by those religious corporations themselves, but by a majority of certain picked tribes. This new law was occasionally repealed and re enacted during the civil wars which lasted till the time of Augustus. The scramble for power, however, during these political vicissitudes, as well as the general advance of knowledge, had rendered its prophetic pretensions ridiculous in the eyes of educated people. By Cicero's time, it had lost its religious character altogether, but was still regarded as one of the highest political dignities, and coveted for the power it conferred.

The modes of divination employed by the augurs were five in number—*augurium ex cœlo, ex avibus, ex tripudiis, ex quadrupedibus, ex diris.* The *first*, relating to the interpretation of the celestial phenomena, such as thunder and lightning, was apparently of Etruscan origin, and held to be of supreme significance. The *second* related to the interpretation of the noise and flight of birds. Not every bird, however, could be a sure messenger of the gods. Generally speaking, those 'consulted,' as it was called, were the eagle, vulture, crow, raven, owl, and hen. The first two belonged to the class of *alites*, or birds whose *flight* revealed the will of the gods; the last four to the class of *oscines*, whose voice divulged the same. These two modes of augury were the oldest and most important. Of the other three, the auguries *ex tripudiis* were taken from the feeding of chickens; the auguries *ex quadrupedibus*, from four-footed animals—as, for instance, if a dog, or wolf, or hare, ran across the path

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of a Roman, and startled him by any unusual motion, he mentioned it to an augur, who was expected to be able to advise him what to do; the auguries *ex diris* (a vague kind of augury), from any trivial accidents or occurrences not included in the previous four—such as sneezing, stumbling, spilling salt on the table, etc.

At Rome, the auspices were taken on the summit of the Capitoline Hill; and the ground on which the augur stood was solemnly set apart for the purpose. The latter then took a wand, and marked out a portion of the heavens in which his observations were to be made. This imaginary portion was called a *templum* (hence *contemplari*, to contemplate), and was subdivided into right and left. According as the birds appeared in either of these divisions were the auspices favorable or unfavorable. How vast were the political influence and authority of the augurs is seen from the fact, that almost nothing of any consequence could take place without their sanction and approval. The election of every important ruler, king, consul, dictator, or pretor, every civic officer, every religious functionary, was invalid if the auspices were unfavorable. No general could lawfully engage in battle—no public land could be allotted—no marriage or adoption, at least among the patricians, was held valid—unless the auspices were first taken, while the Comitia of the Centuries could be dispersed at a moment's notice by the veto of any member of the augural college.

The two terms, auguries and auspices are generally used as synonymous. But a slight difference is perceptible; not the augurs only, but the chief magistrates of Rome (inheriting the honor from Romulus), held the 'auspices,' while the 'auguries' were exclusively in possession of the augurs; but the mode of divination, and the end to be obtained by it, seem to have been the same in both cases.

The power of taking the auspices in war was confined to the commander-in-chief; and any victory gained by a legate was said to be won under the auspices of his superior, and the latter alone was entitled to a triumph. Hence has originated the very common phrase 'under the auspices' of some one, which usually denotes nothing more than that the person alluded to merely lends the influence of his name.

AUGUST, a. *aw-güst'* [L. *augustus*, sacred, majestic: It. *augusto*; F. *auguste*]: majestic; grand; inspiring awe. AUGUST'NESS, n. dignity of appearance; grandeur in mien. AUGUST'LY, ad. *-li*.—SYN. of 'august': grand; great; sublime; noble; majestic; imposing; magnificent; stately; splendid; superb; solemn; awful.

AUGUST, n. *aw'güst:* sixth month in the Roman year, which began with March; it was originally styled *Sextilis*, and received its present name from the emperor Augustus on account of several of the most fortunate events of his life having occurred during this month. On this month he was first admitted to the consulate, and thrice entered the city in triumph. On the same month, the legions from the Janiculum placed themselves under his auspices, Egypt was brought under the authority of the Roman

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Aucuba japonica.

Augers.

Cæsar as an Augur.—From a Roman bas-relief.

The Great Auk (*Alca impennis*).

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people, and an end put to the civil wars. (See Macrobius, i. 12.) As the fifth month, or *Quintilis*, had previously been styled Julius in honor of Julius Cæsar, a day was taken from February to make A. equal with July.—

AUGUSTAN, a. *aw-gŭs'tăn*, pertaining to Augustus or his age; literary or refined.

AUGUSTA, *aw-gŭs'ta:* capital of Richmond co., Ga., at the head of navigation on the Savannah river, 132 m. n.w. of Savannah; the third city in Georgia in wealth and population. It was laid out in 1735, being named after the Princess Augusta, the favorite daughter of George II. The city is situated on a beautiful plain, with wide, straight streets, one of which, Green street, is 168 ft. broad, and beautifully shaded. The houses are large, and surrounded by gardens. The facilities for commerce and transportation include the Savannah river and six lines of railway, A. being the eastern terminus of the Georgia railroad system. The river supplies a magnificent water-power, extensively used in manufacturing, through a canal, completed 1846, and greatly enlarged 1872. The city owns the water-works (value $500,000) and the canal (value $1,500,000), and 1892 had a revenue of $90,000 from them. In 1890 there were 48 manufacturing industries, which had 417 establishments, $7,075,996 capital, and 5,861 hands; paid $1,886,807 for wages, and $4,974,610 for materials; and received $8,631,888 for products. The great Sibley mill, erected on the site of a powder manufactory used during the war, contains 35,176 spindles, and 844 looms. The average yearly cotton receipts of A. are 150,000 bales. The city's trade amounts to $55,000,000 per annum. Its banking business is the largest of any city in the south, comprising 10 banks with an annual business of $200,000,000; the foreign exchange of the city amounting to $17,000,000 per annum. The principal buildings are the City Hall, Masonic Hall, Odd-Fellows' Hall, and Orphan Asylum. There are 3 daily, 5 weekly, and 3 monthly periodicals, 21 churches, a U. S. arsenal, and several hospitals. There is a high school for young women, and one for colored pupils for both sexes. The grammar, intermediate, and primary schools number 15, for white and colored children. The Medical College of Georgia is located here. Among the private institutions of learning are the Houghton Institute, founded by private bequest in 1852, and accommodating 500 pupils; the St. Mary's Academy, the Sacred Heart Academy, Commercial College, and the Telfair private school.

The South Carolina railway connecting A. with Charleston, S. C., was the first steam railway built in the United States, incorporated in 1827, and first used in 1831. The Georgia railroad was chartered in 1833, and completed to Atlanta 10 years later. The headquarters of this road are in A., with machine and repair shops employing 200 hands.

There are also the Central railroad of Georgia, the Port Royal and Augusta railroad, the Charlotte Columbia and Augusta railroad, the Columbia Wilmington and Augusta railroad, and the Augusta and Knoxville railroad recently completed. The city has an inexhaustible water system,

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supplied from the canal; a perfect system of sewage, and a model fire department. In 1891 the valuations were: real $16,041,973, personal $5,309,326, total $21,351,299; 1892, total $22,112,942; and debt 1892, all bonded, $1,751,300. Pop. (1880) 21,891; (1890) 33,300.

AUGUSTA: a town, cap. of Maine; on both banks of the river Kennebec, here crossed by a bridge 520 ft. long; lat. 44° 19′ n., long. 69° 50′ w. Up to A. the river is navigable for sloops from its mouth, 43 m. in a straight line; while a dam immediately above the city enables steamboats to ply more than 20 m. above, as far as Waterville. A. is on the railway between Portland and Bangor. The dam has created a vast water-power, used for manufacturing. Pop. (1880) 8,655; (1890) 10,521.

AUGUSTA, Maria Louisa Catherine, Queen of Prussia, Empress of Germany: b. 1811, Sep. 3; daughter of Charles Frederic, Grand Duke of Saxe Weimar, her mother being a daughter of Paul I. of Russia. The princess having been educated at the court of her grandfather, Charles Augustus, Grand Duke of Saxe Weimar, intimate friend of Goethe, Wieland, and other men of letters resident at Weimar, made their acquaintance, and was on familiar terms in particular with the great German poet, Goethe. Augusta married William, Prince of Prussia, 1829, June 11, and by this marriage became afterwards the queen of Prussia, and, in 1871, empress of Germany. The empress has had but two children, the crown prince of Germany, who married the princess royal of England, and the princess Louisa. She is highly esteemed for benevolence, and respected as a patron of the arts and literature. During the Franco-Prussian war her exertions were unremitting in behalf of wounded soldiers. In 1872, she founded a seminary for the education of daughters of officers slain in the war. D. 1890.

AUGUSTENBURG, *ow'gôs-tén-berg':* little village in the centre of the island of Alsen; noted as the residence of the Duke of Holstein-Sonderburg-Augustenburg, also for its splendid 'stables,' and for the castle belonging to the ducal family. Pop. 800.

AUGUSTI, *ow-goos'tē:* German theologian; 1772–1841, Apr. 28; b. at Eschenberga, near Gotha. He studied at Jena under the celebrated Griesbach. In 1798, he became lecturer in philosophy, and in 1800, prof. extraordinary of the same. Three years later he succeeded Ilgen in the chair of Oriental Literature; but his love of theological studies led him to accept a theological professorship in the Univ. of Breslau. In 1819, he was transferred to Bonn, and made a director of the consistory at Cologne. In his early career, A. was a rationalist; subsequently he returned to orthodox Lutheranism, but was, to the last, free from bigotry. Of his writings, the most important is his *Manual of Christian Archæology* (Leip. 1836–7).

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AUGUSTINE, *aw'gŭs-tĭn*, AURELIUS, ST.: greatest of the Latin fathers of the church; 354, Nov. 13—430, Aug. 28; b. Tagaste, a town of Numidia. His father, Patricius, who was poor, but of good family, and a magistrate, continued a pagan till advanced in years, and was baptized only shortly before his death. Patricius does not seem to have been remarkable for elevation of mind; on the contrary, one may fairly conclude; from his son's statements, that he was an irascible, kind-hearted man, intent on his son's advancement in this world more than in that which is to come. His temper often caused great sorrow to his gentle and pious wife, who loved him faithfully, however, and was therefore rewarded with the secret by which she could charm the evil spirit out of him. Patricius was very anxious that A. should become a fine scholar, as he noticed that not a few people in his day were obtaining large incomes by their 'wits.' A. was accordingly sent to school at Madaura and at Carthage. Before this he had enjoyed the inestimable felicity of a religious education at home. His mother, Monica, had been his best instructor. Neander truly says: 'Whatever treasures of virtue and worth the life of faith, even of a soul not trained by scientific culture, can bestow, were set before him in the example of his pious mother.'

The energy and penetration of intellect exhibited by the young A. excited the most flattering hopes. When he left home for Carthage, a joyous, ardent, and resolute student, a bright career of worldly prosperity seemed to open before him. But strong as A. was, the temptations of Carthage were stronger. His nature, deep, impetuous, passionate, thirsted for excitement. He had just reached the age when happiness is conceived to be synonymous with pleasure, and Carthage, the second city of the empire, was rank as Rome in its sensual corruptions. A. fell. In his *Confessions*, he paints the frightful abyss into which he felt himself plunged; nor does he seek to excuse himself; on the contrary, the shadow of his guilt is thrown forward over all his boyish life, and he displays even a morbid zeal and acuteness in pointing out what others, less censorious, might term the frivolous errors of his childhood, but which seemed to A. the parents of his subsequent vices, and therefore equally bad and equally reprehensible. Before he had reached his eighteenth year his mistress bore him a son, who was named Adeodatus—afterwards baptized along with him at Milan. The thing which appears to have first stirred his deeper being into life was a passage which he suddenly came across in the *Hortensius* of Cicero, treating of the worth and dignity of philosophy. To use the language of Neander: 'The conflict now began in his soul which lasted through eleven years of his life As the simplicity of the sacred Scriptures possessed no attractions for his taste—a taste formed by rhetorical studies and the artificial discipline of the declamatory schools—especially as his mind was now in the same tone and direction with that of the emperor Julian, when the latter was conducted to the Platonic

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theosophy; as, moreover, he found so many things in the doctrines of the church which, from want of inward experience, could not be otherwise than unintelligible to him, while he attempted to grasp, by the understanding from without, what can be understood only from the inner life, from the feeling of inward wants, and one's own inward experiences; so, under these circumstances, the delusive pretensions of the Manichæan sect, which, instead of a blind belief on authority, held out the promise of clear knowledge and a satisfactory solution of all questions relating to things human and divine, presented the stronger attractions to his inexperienced youth.' A. now became a professed Manichæan. Returning to his native town, he lectured for a short time on 'grammar'—that is to say, on literature. Soon afterwards, he returned to Carthage, to pursue his profession under more favorable auspices. Here he wrote, in his twenty-seventh year, his first work, *De Apto et Pulchro*—a treatise on æsthetics, unfortunately lost. About the same time his spiritual nature became keener and more imperative in its demands. The futile speculations of the visionary sect to which he had attached himself now became apparent. He had a series of interviews and conversations with Faustus, one of the most celebrated teachers of Manichæism; and these so utterly disappointed his expectations, that he left the society in disgust and sad bewilderment, after having wasted ten years in a fruitless search for wisdom and truth.

In 383, he went to Rome, followed by the tears, the prayers, and the anxieties of his excellent mother, who was not, however, bereaved of hope, for both her faith and her love were strong. After a short stay, A. left Rome, and proceeded to Milan, where he became a teacher of rhetoric. No change could have been more fortunate. At this time the bishop of Milan was the eloquent and devout St. Ambrose. An intimacy sprung up between the two. A. often went to hear his friend preach. He was not, however, as yet a Christian. He had only emerged, as it were, from Manichæanism—the region of night-clouds and shadows—and was gazing on the gray dawn of the Platonic philosophy, prophetic of the noon-tide splendors of Christianity soon to burst upon his vision. Still, A. did not afterwards despise this preliminary training; he was too great and honest a man for that. He confesses that the Platonic writings 'enkindled in his mind an incredible ardor;' they awakened his deeper spiritual nature, which keenly upbraided him with his sins. Once more he studied the Bible, though from a purely Platonic point of view, and rather wishing to find in it 'those truths which he had already made himself acquainted with from the Platonic philosophy, but presented in a different form.' He began to think that Christ and Paul, by their glorious life and death, their divine morality, their great holiness, and manifold virtues, must have enjoyed much of that 'highest wisdom' which the philosophers thought confined to themselves. For some time he clung to his Platonic Christianity, and shaped the doctrines of the

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Bible according to it; but when he found that it was weak to overcome temptations, and that 'he himself was continually borne down by the ungodly impulses which he thought he had already subdued,' the necessity of a living personal God and Saviour to rescue him from the condemnation of his own conscience, and impart a sanctifying vitality to the abstract truths which he worshipped, shone clear through all the stormy struggles of his heart. In the eighth and ninth books of his *Confessions*, he has left a noble though painful picture of his inward life during this momentous crisis. It is sufficient to say that the Spirit of God triumphed. A., with his natural son, Adeodatus, of whom he seems to have been justly fond, was baptized by Ambrose at Milan, 387, April 25. Shortly afterwards he set out on his return home. At Ostia, on the Tiber, his beloved mother, who had followed him to Milan, died; her eyes had seen the salvation of her son, and she could depart in peace. After her death, and before leaving Italy for Africa, A. wrote his treatises, *De Moribus Ecclesiæ Catholicæ et de Moribus Manichæorum; De Quantitate Animæ;* and *De Libero Arbitrio*. It is unnecessary to relate at any length the subsequent life of Augustine. His character, and principles of action had become fixed, and he now brought the whole majesty of his intellect to bear upon the side of Christianity. Having, as was then customary for converts, divided his goods among the poor, he retired into private life, and composed several treatises—*De Genesi Contra Manichæos; De Musicâ, De Magistro*, and *De Verâ Religione*, which secured him high reputation. In 391, he was ordained a priest by Valerius, Bishop of Hippo; and during the next four years, though earnestly engaged in the work of preaching, contrived to write three different works. In 395, he was made colleague of Valerius. Then ensued a period of hot strife, known in church history as the Donatist and Pelagian controversies. A., having passed through so fierce a fire of personal experience on religious questions, was very jealous both of what he *knew* to be the truth, and of what he only *thought* to be the truth. This, added to his acute and profound intellect, made him, in spite of the lack of historical erudition, a most formidable and relentless antagonist. For this portion of his career see PELAGIUS: PELAGIANISM. In 397, appeared his *Confessiones*, in 13 books—a deep, earnest, and sacred autobiography of one of the greatest intellects the world has seen. Passages of it have no parallel except in the Psalms of David. In 413, he commenced his *De Civitate Dei*, and finished it 426. It is generally considered his most powerful work. Exception may be taken to much that it contains. The learning is no doubt considerable, but it is not accurate. A. was an indifferent scholar; he had studied the Latin authors well; but of Greek 'he knew little, and of Hebrew, nothing.' Many of his reasonings are based on false and untenable premises, and he erred often in his etymological explanations; but in spite of these and other drawbacks, the final impression left on the mind is, that the work is one of the

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most profound and lasting monuments of human genius. In 428, A published his *Retractationes* in which he makes a recension of all his previous writings. It is a work of great candor. He frankly acknowledges such errors and mistakes as he had discovered himself to have committed, explains and modifies numerous statements, and modestly reviews his whole opinions. His end was now drawing nigh. In 429, the Vandals, under the barbarian Genseric, landed in Africa; next year they besieged Hippo. A., now in his seventy-sixth year, prayed that God would help his unhappy church, and grant himself a release out of this present evil world. He died in the third month of the siege.

No mind has exerted greater influence on the church than that of Augustine. Consistency of theological opinion is not to be looked for from him, nor from any of the church fathers. A larger sphere of freedom was permitted to religious speculation in those unfettered days, before creeds were encircled with that traditionary sanctity that they now possess. Nevertheless, there is little difficulty in determining the central tenets of his theological belief. He held the corruption of human nature through the fall of man, and the consequent slavery of the human will. Both on metaphysical and religious grounds, he asserted the doctrine of predestination, from which he necessarily deduced the corollary doctrines of election and reprobation; and finally, he strenuously supported, against the Pelagians, not only these opinions, but also the doctrine of the perseverance of the saints. At the same time, it is but fair to add that, even on such points, his language is far from uniform; that much of the severity of his doctrines arose from the bitter and painful remembrance of his own early sins, and from the profound impression which the corrupt state of society in his time, and the vast desolations of barbarism, had made on his earnest and susceptible soul; and that, in his desire to give glory to God, he sometimes forgot to be kind or even just to man. In illustration of this may be mentioned the fact (see Neander, Mosheim, and Waddington's Church Histories), that the maxim which justified the chastisement of religous errors by civil penalties, even to burning, was established and confirmed by the authority of A., and thus transmitted to following ages. In his epistle to Dulcitius, a civil magistrate who shrank from putting in force the edict of Honorius against heretics, he uses these words: 'It is much better that some should perish by their own fires, than that the whole body should burn in the everlasting flames of Gehenna, through the desert of their impious dissension.' In the opinion of Neander, it was to the somewhat narrow culture, and the peculiar personal experience and temperament of Augustine, that the doctrines of absolute predestination and irresistible grace, first systematized by him, owed much of that harshness and one-sidedness which so long obstructed their general reception by the church, and which continue to render them repulsive to multitudes.

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His life has been written by Tillemont, and his entire works have been repeatedly edited. The Benedictine edition (Paris, 11 vols., 1679–1700) is the best. Numerous editions of the *Confessiones* and *De Civitate Dei* have appeared; the most recent of the latter by Marcus Dods, D.D. In the 'Library of Fathers of the Holy Catholic Church,' are translations into English of A.'s *Confessions, Exposition on St. John's Gospel* and *on the Psalms, Sermons on the New Testament*, and *Short Treatises*. His *Sermon on the Mount* is translated by Trench, and his *Letters* by Rev. J. G. Cunningham.

AU'GUSTINE, St., first Abp. of Canterbury: d. 604: was originally a monk in the convent of St. Andrew at Rome. In 596 he was sent, with forty other monks, by Pope Gregory I., to convert the Anglo-Saxons to Christianity, and establish the authority of the Roman see in Britain. The missionaries were kindly received by Ethelbert, King of Kent, whose wife Bertha, daughter of the king of the Parisians, was a Christian, and retained a Frankish bishop in her suite as chaplain. A residence was assigned to them at Canterbury, then called *Durovernum*, where they devoted themselves to monastic exercises and preaching. The conversion and baptism of the king contributed greatly to the success of their efforts among his subjects, and it is recorded that in one day A. baptized 10,000 persons in the river Swale. Nominal as much of this conversion must have been, there is abundant testimony to the fact that a marked improvement in the life and manners of the Anglo-Saxons followed the evangelistic labors of A. and his companions.

In 597, he went to Arles, by direction of the pope, and was there consecrated Abp. of Canterbury and Metropolitan of England. On his return, he despatched a presbyter and monk to Rome, to inform the pope of his success, and obtain instruction on certain questions; Gregory's advice with regard to the propagation of the faith are admirable examples of that pious ingenuity which has often characterized the missionary policy of the Church of Rome. Thus, instead of destroying the heathen temples, A. was recommended to convert them into Christian churches, by washing the walls with holy water, erecting altars, and substituting holy relics and symbols for the images of the heathen gods. A.'s subsequent efforts to establish his authority over the native British church were not so successful as his missionary labors. He was buried in the churchyard of the monastery bearing his name, founded by King Ethelbert. His body was removed to the cathedral of Canterbury, 1091. Bede's *Historia Ecclesiastica Gentis Anglorum* is the great authority for the life of St. Augustine. A thoughtful and pleasing sketch of it is in the Rev. Arthur P. Stanley's *Historical Memorials of Canterbury*, Lond. 1855.

The site and remains of St. A.'s monastery were purchased, 1844, by Mr. Beresford Hope, by whom they were presented to the Abp. of Canterbury in trust, for the erection of a missionary college in connection with the

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Church of England. This institution was incorporated by royal charter, 1848. The buildings, in which as much of the ancient structure as possible has been preserved, have accommodation for about 45 students, whose course of study extends over three years. Twenty exhibitions have been founded in connection with the college.

AUGUSTINS, n. plu. *aw-güs'tĭne*, or AUGUSTINES: monks who follow the doctrines and rules of St. Augustine. AUGUSTINIAN, n. *aw'güs-tin'i-ăn*, one of an order of monks so named; one who holds with St. Augustine that grace is absolutely effectual from its inherent nature.

AUGUS'TINS, or AUGUS'TINES, or AUGUSTIN'IANS: names of several religious bodies in the Rom. Cath. Church. Whether St. Augustine ever framed any formal rule of monastic life, is uncertain; but one was deduced from his writings, and was adopted by as many as thirty monastic fraternities, of which the chief were the Canons Regular, the Knights Templars (q.v.), the Begging Hermits, the Friars Preachers or Dominicans (q.v.), and the Premonstratensians (q.v.). The CANONS REGULAR OF ST. AUGUSTINE, or AUSTIN CANONS, appear to have been founded or remodelled about the middle of the 11th c. Their discipline was less severe than that of monks properly so-called, but more rigid than that of the secular or parochial clergy. They lived under one roof, having a common dormitory and refectory. Their habit was a long cassock, with a white rochet over it, all covered by a black cloak or hood, whence they were often called Black Canons. In England, where they were established early in the 12th c., they had about 170 houses, the earliest, it would seem, being at Nostell, near Pontefract, Yorkshire. In Scotland, they had about 25 houses: the earliest at Scone was founded 1114, and filled by canons from Nostell; the others of most note were at Inchcolm in the Firth of Forth, St. Andrews, Holyrood, Cambuskenneth, and Inchaffray.

The BEGGING HERMITS, HERMITS OF ST. AUGUSTINE or AUSTIN FRIARS, were a much more austere order, renouncing all property, and vowing to live by the voluntary alms of the faithful. They are believed to have sprung from certain societies of recluses who, in the 11th and 12th c., existed especially in Italy without any regulative constitution. At the instigation, as is alleged, of the rival fraternities of Dominicans and Franciscans, Pope Innocent IV., about the middle of the 13th c., imposed on them the rule of St. Augustine, whom they claimed as their founder. In 1256, Pope Alexander IV. placed them under the control of a superior or president called a 'general.' In 1287, a code of rules or constitutions was compiled, by which the order long continued to be governed. About 1570, Friar Thomas of Jesus, a Portuguese brother of the order, introduced a more austere rule, the disciples of which were forbidden to wear shoes, whence the were called *discalceati* or 'barefooted friars.'

The degeneracy of the order in the 14th c. called into

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existence new or reformed Augustinian societies, among which was that Saxon one to which Luther belonged. But in his day even these had fallen victims to the general corruption of the priesthood, and he inflicted serious injury upon it by his unsparing denunciations. After the French Revolution, the order was wholly suppressed in France, Spain, and Portugal, and partly in Italy and s. Germany. It was diminished even in Austria and Naples. It is most powerful in Sardinia and America.

The name of AUGUSTINES was given also to an order of nuns who claimed descent from a convent founded by St. Augustine at Hippo, and of which his sister was the first abbess. They were vowed to the care of the sick and the service of hospitals. The Hôtel-Dieu at Paris is still served by them.

AUGUSTOWO, *ow-gŏs-tō'vō:* town of Poland, cap. of a circle of the same name: on the Netta, a feeder of the Bug; 138 m. n.e. from Warsaw. It was founded by Sigismund Augustus, King of Poland, 1557. It has woolen and linen manufactures, and some trade in horses and cattle. Great part of the surrounding districts is occupied by lakes and marshes, or covered with forests. Pop. 12,000.

AUGUSTULUS, *aw-gŭs'tū-lŭs*, ROMULUS: the last emperor of the western portion of the Roman empire. His name was Augustus, but the diminutive title under which he is universally known was given him by the Romans on account of the essential littleness of his character. He was the son of Orestes, a Pannonian of birth and wealth, who rose to high rank under the emperor Julius Nepos, whose favor he repaid by stirring up the barbarian troops in the pay of Rome to mutiny against him. On the flight of the emperor, Orestes conferred the vacant throne on his son A. (476), retaining all substantial power in his own hands. Orestes failing to conciliate the barbarians, who had helped him against Nepos, with a grant of the third of the lands of Italy, they, under the command of Odoacer, besieged him in Pavia, and capturing, put him to death. A. yielded at once, and being of too little consequence to be put to death, he was dismissed to a villa near Naples with an annual pension of 6,000 pieces of gold.

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AUGUSTUS, *aw-gŭs'tŭs*, CAIUS JULIUS CÆSAR OCTAVIANUS: B.C. 63, Sep. 23—A.D. 14, Aug. 19; son of Octavius and Atia (dau. of Julia, younger sister of Julius Cæsar). The Octavian family came originally from Velitræ, in the country of the Volsci; and the branch from which A. descended was rich and honorable. His father had risen to the rank of senator and pretor, but died in the prime of life, when A. was only four years old. A. was carefully educated in Rome under the guardianship of his mother and his step-father, Lucius Marcius Philippus. At the age of 12, A. delivered a funeral oration over his grandmother; at 16, he received the toga virilis. The talents of the youth recommended him to his grand-uncle, Julius Cæsar, who adopted A. as his son and heir. At the time of Cæsar's assassination (B.C. 44, March 15), A. was a student under the celebrated orator Apollodorus, at Apollonia in Illyricum, where, however, he had been sent chiefly with a view to gain practical instruction in military affairs. He returned to Italy, assuming the name of Julius Cæsar Octavianus, and at his landing at Brundusium was welcomed by deputies from the veterans there assembled; but declining their offers, he chose to enter Rome privately. The city was at this time divided between the two parties of the republicans and the friends of Mark Antony; but the latter had, by adroit maneuvers, gained the ascendency, and had almost absolute power. A. was at first haughtily treated by the consul, who refused to surrender the property of Cæsar. After some fighting, in which Antony was worsted, and had to flee across the Alps, A., who had made himself a favorite with the people and the army, succeeded in getting the will of Julius Cæsar carried out. He found an able friend and advocate in Cicero, who had at first regarded him with contempt. The great orator, while imagining that he was laboring in behalf of the republic, was in fact only an instrument for raising A. to supreme power. When Antony returned from Gaul with Lepidus, A. joined them in establishing a triumvirate. He obtained Africa, Sardinia, and Sicily; Antony, Gaul; and Lepidus, Spain. Their power was soon made absolute by the massacre of those unfriendly to them in Italy, and by victories over the republican army in Macedonia, commanded by Brutus and Cassius. After the battle of Philippi, won by A. and Antony, of which the former unjustly claimed all the credit, whereas it mainly belonged to the latter, the triumvirs made a new division of the provinces—A. obtaining Italy, and Lepidus Africa. The Perusian war, excited by Fulvia, wife of Antony, seemed likely to lead to a contest between A. and his rival; but was ended by the death of Fulvia, and the subsequent marriage of Antony with Octavia, sister of Augustus. Shortly afterwards, the claims of Sextus Pompeius and Lepidus having been settled by force and fraud, the Roman world was divided between A. and Antony; and a contest for supremacy commenced between them. While Antony was lost in luxurious dissipation at the court of Cleopatra, A. was industriously striving to gain the love and confidence of

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the Roman people, and to damage his rival in public estimation. At length war was declared against the queen of Egypt, and at the naval battle of Actium (q.v.), B.C. 31, A. was victorious, and became sole ruler of the Roman world. Soon afterwards, Antony and Cleopatra ended their lives by suicide. The son of Antony by Fulvia, and Cæsarion, son of Cæsar and Cleopatra, were put to death; and in B.C. 29, after disposing of several affairs in Egypt, Greece, Syria, and Asia Minor, A. returned to Rome in triumph, and closing the temple of Janus, proclaimed universal peace.

His subsequent measures were mild and prudent. To insure popular favor, he abolished the laws of the triumvirate, adorned the city of Rome, and reformed many abuses. At the end of his seventh consulship (B.C. 27), he proposed to retire from office, in order that the old republican form of government might be re-established, but he was ultimately induced to retain his power. Hitherto, since Cæsar's death, the consul had been named Octavian; but now the title of *Augustus* (meaning 'sacred' or 'consecrated') was conferred on him. In the eleventh consulship of A. (B.C. 23), the tribunitian power was conferred on him for life by the senate. Republican names and forms still remained, but they were mere shadows. A. was in all but name absolute monarch. In B.C. 12, on the death of Lepidus, he had the high title of Pontifex Maximus, or High Priest, bestowed on him. The nation surrendered to him all the power and honor that it had to give.

After a course of victories in Asia, Spain, Pannonia, Dalmatia, Gaul, etc., A. (B.C. 9) suffered the greatest defeat he had sustained in his long career, in the person of his general, Quintilius Varus, whose army was totally destroyed by the Germans.

This loss so afflicted A , that for some time he allowed his beard and hair to grow, as a sign of deep mourning, and oftcd exclaimed: 'O Varus, restore me my legions!' From this time A. confined himself to plans of domestic improvement and reform, and so beautified Rome, that it was said, 'A. found the city built of bricks, and left it built of marble.' He also founded cities in several parts of the empire; and altars were raised by the grateful people to commemorate his beneficence; while, by a decree of the senate, the name Augustus (August) was given to the month Sextilis.

Though surrounded thus with honor and prosperity, A was not free from domestic trouble. The abandoned conduct of his daughter Julia was the cause of sore vexation to him. He had no son, and Marcellus, the son of his sister, and Caius and Lucius, the sons of his daughter, whom he had appointed as his successors and heirs, as well as his favorite step-son Drusus, all died early; while his step-son Tiberius was an unamiable character whom he could not love. Age, domestic sorrows, and failing health warned him to seek rest; and, to recruit his strength, he undertook a journey to Campania; but his infirmity increased, and he died at Nola in the 77th year of his age. According to tradition, shortly before his death, he called for a mirror,

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arranged his hair neatly, and said to his attendants: 'Have I played my part well? If so, applaud me!' A. had consummate tact and address as a ruler and politician, and could keep his plans in secrecy while he made use of the passions and talents of others to forward his own designs. The good and great measures which marked his reign were originated mostly by A. himself. He encouraged agriculture, patronized the arts and literature, and was himself an author; but only a few fragments of his writings have been preserved. Horace, Virgil, and all the most celebrated Latin poets and scholars were his friends. His was the *Augustan Age* of literature. His death threw a shade of sorrow over the whole Roman world; the bereaved people erected temples and altars to his memory, and numbered him among the gods.

AUGUS'TUS, Elector of Saxony: 1526, July 31—1586, Feb. (ruled 1553–86); son of Duke Henry the Pious, and of Katherine of Mecklenburg; b. at Freiberg, then the seat of his father's court. In 1548, he married Anna, daughter of Christian III. of Denmark, who was universally popular for her devoted adherence to Lutheranism and her domestic worth. After the death of his brother, Maurice, 1553, A. succeeded to the electorate. His rule is noticeable chiefly as bearing upon the history of the newly established Protestant Church. Equally intolerant and inconsistent in his theology, A. first used his utmost influence in favor of the Calvinistic doctrine of the sacraments; and then, 1574, adopted the Lutheran tenets, and persecuted the Calvinists. On the other hand, however, it must be owned, to his honor, that, by his skilful internal administration, he raised his country far above the level of any other in Germany, introducing valuable reforms in jurisprudence and finance, and giving a decided impetus to education, agriculture, manufactures, and commerce. He even wrote a book on the management of orchards and gardens, and commanded that every newly-married pair should, within the first year of their marriage, plant two fruit-trees. The Dresden Library owes its origin to him, as do also most of its galleries of art and science. His own favorite private pursuit was that of alchemy, in which the Electress Anna took part. In 1586, Jan.—the electress having died in the previous year—A. married a young princess of Anhalt, but died a month after, and was buried in the cathedral of Freiberg. He was succeeded by his son, Christian I.

AUGUS'TUS II., FREDERICK, commonly called the Strong. Elector of Saxony, King of Poland: 1670–1733, Feb.; b. Dresden; second son of the elector John George III. and of the Danish princess Anna Sophia. His extraordinary strength was developed by a careful physical education, and his mental faculties more successfully cultivated than his morals. From 1687 to 1689 he travelled over the greatest part of Europe, but was prohibited by his father from visiting Rome. Upon his father's death (1691), he went to Vienna, and there formed an intimacy with Joseph, King of Rome, which materially influenced his politics. When, in 1694, he succeeded to his brother George

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as elector, instead of turning his arms against France, according to previous arrangement, he undertook the command of the Austro Saxon army against the Turks in Hungary. After the battle of Olasch, 1696, he returned to Vienna as a candidate for the throne of Poland, vacated by John Sobieski. Bidding higher than Prince Conti for the crown (10,000,000 Polish florins), and adopting the Rom. Cath. faith, he was elected king by the venal nobles; and having, by his imposing force, awed the adherents of Conti, he was crowned at Cracow, 1697, Sep. 15. Ascending the throne, he promised to regain, for his new kingdom the provinces that had been ceded to Sweden; but his efforts to do this only led to the defeat of himself and his allies, his own deposition as king of Poland, the election of Stanislaus Leszcynski, and the ignominious peace of Altranstädt, 1706. So complete was his humiliation, that A. was compelled to send a letter of congratulation to the new Polish king, together with all the crown-jewels and archives. However, on receiving intelligence of the defeat of Charles XII. at Pultowa, 1709, he declared the treaty of Altranstädt annulled, marched with a powerful army into Poland, formed a fresh alliance with the czar, and recommenced a war with Sweden, which continued with fury, till the death of Charles XII. at Frederickshall, 1718, gave a new aspect to affairs, leading first to a truce, and eventually to a peace with Sweden. Meanwhile, a confederation, headed by a Polish nobleman, had been formed against the Saxons, and repulsed them with much success, till, in 1716, through the mediation of the czar, a compact was made between the Poles and A., agreeably to which the Saxon troops left the kingdom. The king now found himself obliged to employ conciliation, and the splendor of his dissolute court soon won the favor of the Polish nobles, who followed his example but too closely. Saxony had bitter cause to regret the union of the crowns. Its resources were shamefully squandered, even when want and famine were in the land, on the adornment of the capital, on the king's mistresses, his illegitimate children, and the alchemists who deluded him with hopes of the elixir of life. A. supported the fine arts as ministering to luxury, but did little for the cause of science. Despotic in principle, though easy in temper; ambitious as well as luxurious; reckless alike in the pursuit of war and pleasure, death overtook him in the midst of projected festivities. On his way to the Warsaw diet, gangrene of an old wound set in, he died, and was buried at Cracow. By his wife—a Protestant, dau. of the Margrave of Brandenburg-Kulmbach—he left an only son, who succeeded to him. The most celebrated of his numerous illegitimate offspring—amounting, it is affirmed, to somewhere about 300—was Maurice, Count of Saxony.

AUGUSTUS III., FREDERICK, Elector of Saxony, King of Poland: 1696, Oct.—1763; the son and successor of Augustus II.; carefully educated by his mother in the Protestant faith. At the age of fifteen, however, he left her tutelage for a tour through Germany, France, and Italy, where he changed his religion, secretly professing

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adhesion to the Roman Church, at Bologna, 1712, though the fact was not publicly known in Saxony till five years later. It is possible that an eye to the crown of Poland, and to an alliance with one of the Austrian princesses, may have had something to do with this step. After succeeding his father in the electorate, 1733, he was chosen king of Poland by a part of the nobility, and triumphing over the rival claims of Stanislaus Leszcynski, supported by Louis XV., was unanimously proclaimed three years later. He inherited his father's sumptuous tastes, though not his talents; and his love of art, cultivated by his Italian tour, enriched the gallery of Dresden with noble paintings. The government of his country he made over entirely to his prime minister, Count von Bruhl, whose whole political system consisted in complete dependence upon Russia. In 1742, alarmed at the increased power Prussia had obtained by the conquest of Silesia, A. formed an alliance with Maria Theresa; and by the secret treaty of Leipsic, contracted to supply her with 50,000 men. But their united troops were completely routed by the Prussians, 1745; Frederick II. pushed on into Saxony, and A. fled from his capital, saving his art-treasures, but leaving his state-papers in the hands of the conqueror. In 1746, the peace of Dresden restored him Saxony; but the close of the year again saw him embroiled with Prussia. Joining the camp at Pirna, he narrowly escaped being taken prisoner, and fled to Poland, where his popularity, never very great, was much diminished by his recent reverses in Saxony, added to which the Empress Catherine of Russia used every effort to dislodge him, as being an ally of France. At the conclusion of the peace of Hubertsburg, A. returned to Dresden, where he died. His son, Frederick Christian, succeeded him in the electorate, and Stanislaus Poniatowski became king of Poland.

AUK, *awk* [Dan. *alke*], (*Alca*): genus of web-footed birds, type of a family called *Alcadæ*, which was in great part included in the Linnæan genus *Alca*, and to many of the species of which, now ranked in other genera, the name A. is still popularly extended. The *Alcadæ* are among those web-footed birds called *Brachypteres* (*i.e.*, short-winged) or Divers by Cuvier, remarkable for the shortness of their wings, which they employ as fins or paddles for swimming under water, some being even incapable of flying; and for the position of their legs, further backward than in other birds, which makes walking difficult, and compels them, when on land, to maintain an upright attitude. They are distinguished by the very compressed bill, which, in the true auks, is vertically elevated, and so sharp along the ridge as to resemble the blade of a knife; and by their entirely palmated feet, destitute of hind toes. The auks are confined to the seas of the n. hemisphere—the penguins taking their place in the s. All of them have a dense plumage, generally with a beautifully polished appearance and silvery lustre. The genus *Alca*, as restricted by Cuvier and others, contains only two species, distinguished from the Puffins (q.v.),

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which also belong to this family, chiefly by the greater length of the bill, and its being covered with feathers as far as the nostrils. The bill, both in the auks and puffins, is transversely and strongly grooved. But even the two known species of the restricted genus *Alca* differ from one another in a most important particular—the wings of the one, the Great A., being so short that it is quite incapable of flight, like the penguins, of which it may be deemed the true northern representative, while the other, the razor-bill, has comparatively long wings, and flies well.

The GREAT AUK (*Alca impennis*), so far as is known, is now extinct. It was about three ft. in height, an inhabitant of the temperate region of the n. Atlantic. At one time large numbers bred on St. Kilda, and in prehistoric times it appears to have bred on Oronsay or neighboring skerries, and possibly frequented other islands of the Hebrides. It was occasionally seen at Orkney and Shetland, and probably bred at Papa Westra until 1812. It was rare along the shores of Norway and Sweden, but in prehistoric times frequented the fjords of Denmark, as its remains have been repeatedly found in the Danish kjökken-möddings. There is only one breeding-place in Greenland on record, and that is Gunnbjorneskjoerne, supposed the same as Danell's or Graah's Islands. It bred on several skerries off the coast of Iceland, and the last Great Auks are supposed to have been killed on one of these named Eldey in 1844. In the North American habitat it bred in great numbers on Funk and other islands off the coast of Newfoundland, on some islands in the Bay of St. Lawrence, at Cape Breton, and probably at Cape Cod. Its remains have been found in shell-heaps at several places on the coast of Maine and Massachusetts. The Great Auk was invaluable as food, and but for the abundant fresh supplies afforded by its carcasses to the early voyagers, the fisheries at the Banks of Newfoundland would hardly have been developed as they were. The birds were so stupid, they sat still until they were knocked over by the seamen's short clubs, or allowed themselves to be driven on board the vessels in hundreds across sails or planks stretched from the gunwales to the shore. The rapidity with which this bird moved under water was extraordinary; one of them having been pursued by a six-oared boat for hours in vain. Like most of the *Alcadæ*, the Great Auk each year laid only one egg, about 5 inches in length, and 3 in maximum breadth. It laid it on the bare rock, without any attempt at a nest.—The RAZOR-BILL (q.v.) (*A. torda*) is the only other species now commonly included in the genus *Alca*. The name LITTLE AUK is often given to a bird called also the ROTCHE (q.v.) (*Mergulus alle*, formerly *Alca alle*), common in Arctic regions.—The common puffin is sometimes called the Labrador Auk.—The n. parts of the Pacific Ocean abound in auks remarkable for a somewhat quadrangular bill, notched near the tip, and which form the genus *Phaleris*. One of them, *P. psittacula*, is known as the Parrakeet Auk.—All the auks

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feed upon fishes, crustaceans, and other marine animals, which they pursue under water, and for which they dive to great depths. See Symington Grieve's *The Great Auk* (Edin. 1885).

AULA, n. *aw'la* [L. *aula*—from Gr. *aulē*, a courtyard or its wall; the court or quadrangle around which the house itself was built; any court or hall; the court, or *aula regia*]: a court barn; in some old *eccl. writers*, the nave of a church. A. REGIA or REGIS, a court established by William the Conqueror in his own hall, and comprised of the great officers of state usually attendant on his person. It was ultimately transferred to Westminster Hall.

AULAPOLAY', or ALEPPI: town of India, in the native state of Travancore, on the sea-coast; 9° 30′ n. lat., 76° 24′ e. long. There is no shelter for shipping, but ships anchor four or five m. from the shore. There is considerable trade in timber, betel-nut, coir, pepper, and cardamoms. This town communicates with Quilon and Trivandrum on the s., and with Cochin on the n., by canals parallel with the sea-coast, connecting a series of lakes or back-waters. Between these and the sea is a communication by a wide creek, through which the timber for exportation is floated, brought from the forests of the Rajah of Travancore on the Western Ghauts.

AULARIAN, n. *aw-lā'rĭ-ăn* [L. *aula*, a hall], at Oxford, the member of a hall, as distinguished from a collegian.

AULAX, n. *aw'lăks* [Gr. *aulax*, a furrow, in allusion to the furrows on the under side of the leaves in one species]: genus of plants belonging to order *Proteaceæ*, or *Proteads*. The species are pretty shrubs, with narrow leaves.

AULD LANG-SYNE, n. *awld' lăng-sīn'* [Scot. *auld*, old; *langsyne*, time long past—from *lang*, long, and *syne*, then, time past, since]: days that are long past; long, long ago.

AULETIC, a. *aw-lĕt'ĭk* [Gr. *auletikos*, suitable for a pipe or flute—from *aulos*, a flute or other wind instrument]: pertaining to the pipe or flute.

AULIC, a. *aw'lĭk* [L. *aulĭcus*; Gr. *aulikos*—from Gr. *aulē*, a royal palace]: of or pertaining to a royal court.

AULIC COUNCIL: one of the two highest courts of the old German empire, co-ordinate with the Imperial Chamber. It came into existence 1495, and seems to have been at first employed principally in preparing business matters regarding the crown lands and the empire generally, in order to expedite the decisions of the Imperial Chamber. It soon began to assume or acquire higher functions. After 1502, the states submitted important grievances to its independent consideration; but it did not receive a fixed constitution before 1559. In 1654, it was formally recognized as the second of the two supreme courts, and equal in dignity to the Imperial Chamber. It was composed of a pres., a vice-pres., a vice-chancellor, and eighteen councilors, all chosen and paid by the emperor, with the exception of the

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Auk.—Razor-bill (*Alca torda*).

Auricula (*Primula auricula*).

Auricula (*Primula auricula.*) Another specimen.

Aurochs (*Bos urus*).

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vice-chancellor, who was appointed by the Elector of Mainz. Of the eighteen councilors, six were Protestants, whose votes, when they were unanimous, could not be set aside by those of the others, so that a religious parity was to some extent preserved. The councilors were divided into three classes—counts, barons, and men of learning—all of whom were on a footing of equality, except that the last mentioned received a higher salary, and were usually advanced into the ranks of the nobility. The council held aloof from politics, but under its jurisdiction were placed: 1st, all matters of feudality in which the emperor was immediately concerned; 2d, all questions of appeal on the part of the states from decisions in favor of the emperor in minor courts; 3d, whatever concerned the imperial jurisdiction in Italy. On the death of the emperor, the council was dissolved, and had to be reconstructed by his successor. It finally ceased to exist on the extinction of the old German empire, 1806.

AULOPUS, n. *awl'op-ŭs* [Gr. *aulos*, a flute; *pous*, foot]: genus of fishes belonging to family *Salmonidæ*.

AULOSTOMA, n. *aw-lŏs'tom-a*, or AULOS'TOMUS, n. [Gr. *aulos*, a flute; *stoma*, mouth—*lit.*, flute-mouthed]: genus of spiny-finned fishes, of family *Fistularidæ*. Like the rest of the family, the snout ends in a tube. The only known species is from the Indian Ocean.

AUMAILED, a. *ow-māld'*: OE. for ENAMELLED (q.v.).

AUMALE, *ō-mâl'*: town of Algeria; on one of the head-waters of the Sahel, 57 m. s.e. from Algiers; on the great road from Algiers to Constantine. It is a strong military post, with barracks, magazines, and hospitals. Pop. 5,196, of whom 1,468 European.

AUMALE, *ō-mâl'*, CHARLES DE LORRAINE, Duc d': 1554-1631; an ardent partisan of the League in the politico-religious wars which devastated France in the latter half of the 16th c. The aim of the League was ostensibly to suppress the Huguenots, but in reality to secure the supreme power to the Guises. Closely allied by blood to this crafty and ambitious family, A. from the very first entered with fanatical sympathy into its schemes; and after the murder of the Duke of Guise at Blois in December, 1588, he became, with the Duke of Mayenne, the leader of the party. In 1589, he seized Paris, dissolved the parliament, and imprisoned its members. Shortly afterwards he put himself at the head of a body of troops to attack the town of Senlis, but was defeated by La Noue, and compelled to retreat. Always unfortunate in war, his presence seemed to insure the overthrow of his friends. He commanded a portion of the forces of the League at the battles of Arques and Ivri, where the Huguenots triumphed under their skilful and sagacious monarch, Henry IV. But A. was as obstinate as he was unlucky, and in the end proved himself as traitorous as he was obstinate. He held out for the League in Amiens until the populace expelled him, when he suddenly allied himself with the Spaniards who had invaded Picardy, refused the royal pardon, and delivered

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over to the enemy several places in his possession. For this he was impeached, condemned, and sentenced to be broken alive on the wheel. His property was confiscated, but he himself escaped, and lived in exile till his death.

AUMALE, HENRI-EUGÈNE-PHILIPPE, LOUIS D'ORLEANS, Duc d': b. Paris, 1822, Jan. 16; fourth son of the late king of France, Louis Philippe. He enjoyed the privilege —rare among princes—of being educated with his fellow-men, at the college of Henri IV. When 16 years of age, he entered the army, soon distinguished himself by his bravery, and passed rapidly through the various grades of rank. In 1843, in Algeria, he commanded a subdivision of the French army, and performed some brilliant exploits, the most signal of which was his surprising Abd-el-Kader, when encamped in the environs of Goudjilab, 1843, May 16, capturing a multitude of cattle, 4 standards, 3,600 prisoners, and the correspondence and treasure of the emir. He was, in consequence, elevated to the rank of lieut.gen., and appointed to the government of the prov. of Constantine. In 1847, he succeeded Marshal Bugeaud as gov.-gen. of Algeria. While holding this high office, he was exposed to a series of bitter attacks by the democratic 'opposition' in the chamber of deputies, but was ably defended by Guizot. After the expulsion of his father, he withdrew from Algeria, having first, with self-denying patriotism, exhorted the colony peaceably to obey the orders of the metropolis. He resided in England till 1871, when he returned to France, and was elected a member of the assembly. He was elected a general of division, 1872, and presided over the council of war which tried Marshal Bazaine. He was elected a member of the Academy 1871, expelled from France 1886, July 13, and authorized to return 1889, Mar. 9. He notified the French people 1886, Aug. 29, of his intention to bequeath to the Institute of France his domain of Chantilly, with all its vast treasures of war, art, literature, and history, the whole estimated to be worth $50,000,000. He died 1897.

AUMBRY, n. *awm'brĭ*, or AUMRY, n. *awm'rĭ* [other spellings of AMBRY, which see]: in a church or cathedral, a closet in the side of the wall by the altar, in which the sacred vessels were kept; they are of different sizes in other parts of a sacred edifice, and used for various purposes.

AUME: see AWME.

AUNE, *ōn:* French cloth-measure corresponding to the English *ell*. Both words are derived from the Lat. *ulna*. The English ell = 1¼ yard = 45 inches; the French *aune usuelle* (or *nouvelle*) = 1⅛ mètre = 47¼ inches English. The old *aune* was a little shorter.

AUNOY, *ō-nwá*, MARIE-CATHERINE-JUMELLE DE BERNEVILLE, Comtesse d': abt. 1650—1705, Jan.: celebrated French authoress of the reign of Louis XIV. She composed fairy tales, romances, and historical memoirs. Among her fairy tales were *The Yellow Dwarf*, *The White Cat*, and *Cherry and Fair Star*. Many of these fictions have been translated into English, and are greedily read

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AUNT, n. *ânt* [F. *tante:* OF. *ante*, an aunt—from L. *amĭta*, an aunt]: the sister of one's father or mother.

AURA, n. *aw'ra* [L. and Gr. *aura*—from Gr. *āō*, I blow or breathe]: a very gentle breeze; a breath; a subtle invisible vapor supposed to proceed from a body; in *med.*, a peculiar sensation which sometimes gives warning of a fit of epilepsy. AURIC, a. *aw'rĭk*, pertaining to the aura.

AURAL, a. *aw'răl* [L. *auris*, an ear]: pertaining to the ear and its diseases.

AURALITE, n. *aw'ra-līt* [Ger. *auralit*—from *aura* (?); Gr. *lithos*, stone]: a mineral from Abo, in Finland. According to the Brit. Mus. Catalogue, it is a variety of Dichroite; according to Dana, it is an altered condition of Iolite.

AURANTIACEÆ, *aw-răn'tĭ-ā'sē-ē* [from *aurantium*, mod. Lat. for an orange]: a nat. ord. of exogenous plants, shrubs, and trees, now appended to the order *Rutaceæ*. Both leaves and bark are generally very smooth, and all parts are filled with little transparent receptacles of a fragrant volatile oil, which especially abounds in the leaves and in the rind of the fruit. The leaves are alternate, and always articulated with their stalks, which are frequently winged. The flowers have a short, 3–5 toothed, withering calyx, and 3–5 petals, which are broad at the base, sometimes slightly coherent, and imbricated in bud. The stamens are equal in number to the petals, or a multiple of their number; the filaments sometimes slightly coherent in one or more bundles; the anthers terminal and erect. The stamens and petals are inserted on a disk. The ovary is free; there is one style with a thickish stigma. The fruit (a *hesperidium*) is pulpy, with a leathery or spongy rind, of one cell, or of a number of separable cells; the seeds attached to the axis, with thick cotyledons and no albumen, not unfrequently containing more embryos than one.—The order contains abt. 100 known species, natives of warm climates, and almost all of the East Indies. The species of the genus Citrus (q.v.) are the best known, among which are the orange, lemon, citron, etc. But the order contains many other plants producing agreeable fruits, among which the *Ægle Marmelos* (see ÆGLE)—called Bhel, or Bael, in India—*Cookia punctata* (the Wampee), *Glycosmis citrifolia*, and *Triphasia trifoliata* deserve particular notice. The fruits ripe, and unripe, juice and rind, the flowers, leaves, bark, etc., of a number of species are employed medicinally. The leaves of *Bergera Kœnigii* are used by the Hindus as a stomachic and tonic, the bark and roots as stimulants.—*Feronia elephantum*, a large tree growing in most parts of India, yields a gum which closely resembles gum-arabic, and is used for similar purposes. The young leaves of this tree have a smell like that of anise, and are used by the native practitioners of India as a stomachic and carminative.—*Skimmia* (or *Limonia*) *Laureola* and *Skimmia Japonica* are remarkable exceptions in this order, as to the climate to which they are adapted: the former grows on the cold and lofty mountains of the n. of India,

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braving frost and snow; the latter, a beautiful shrub, recently introduced into Britain from Japan, is perfectly hardy even in the severest winters; its evergreen leaves and pretty little red berries remaining uninjured by frost.

AURATE, n. *aw'rāt* [L. *aurum*, gold]: a salt of auric acid. AURA'TED, a. of or like gold. AURIC, a. *aw'rĭk*, of or from gold; resembling gold; pertaining to gold; in *chem.* applied to those gold compounds in which that element has its higher valency, e.g., auric sulphide, auric oxide. AUROUS, n. *aw'rŭs*, full of gold; (more loosely) containing more or less of gold; in *chem.*, with gold univalent in its composition.

AUREATE, a. *aw'rĕ-āt* [mid L. *aurĕātus*, golden—from *aurātus*, gilded—from L. *aurum*, gold]: in *OE.*, golden. AUREOLIN, n. *aw-rē'ō-lĭn*, name in trade for the pigment cobalt-yellow. AUREOUS, a. *aw'rē-ŭs*, of golden-yellow color.

AURELIA, n. *aw-rē'lĭ-a* [L. *aurum*, gold: *au'rĕŏlus*, golden]: the chrysalis of an insect, more especially of a butterfly. See CHRYSALIS. AURE'LIAN, a. *-ĭ-ăn*, pertaining to the aurelia: N. an amateur collection of insects. AUREOLA, a. *aw-rē'ŏ-lă*, golden, as applied to a crown or golden nimbus: N. a circle of rays round the head of a portrait, to indicate something more than human—popularly called a glory.

AURELIANUS, *aw-rē-lĭ-ā'nŭs*, LUCIUS DOMITIUS—also named CLAUDIUS DOMITIUS and VALERIUS—one of the most powerful of the Roman emperors: 212–276; of humble origin, his father having been a husbandman. Enlisting early as a common soldier, he rapidly distinguished himself, and held the highest military offices under Valerianus and Claudius II. On the death of Claudius (270), A. was elected emperor by the army. He commenced his reign by vigorous attack on the barbarian Alemanni, or Marcomanni, whom he expelled. Thereafter, he began a new line of fortified walls round Rome, not completed till the reign of Probus (276). Their ruins still mark the boundaries of Rome in the time of Aurelian. Finding that the province of Dacia (now Wallachia) could not be maintained against the assaults of the Goths, he surrendered it, on certain conditions, and strengthened the frontier of the Roman empire by making the Danube its boundary. He next turned his attention to the East, where the renowned queen Zenobia (q.v.) had extended her sway from Syria to Asia Minor and Egypt. A. defeated her in two battles, and besieged her in Palmyra, from which she attempted to escape, when she saw defense would prove unavailing. She was taken prisoner, and soon the city surrendered, and was treated leniently. Shortly after A. had departed, a new insurrection took place. He returned, in 273, and gave the splendid city up to destruction. A. was again called to the East by a rebellion in Egypt, instigated by Firmus, a merchant of great influence, which he speedily quelled. Besides, Tetricus, who had held imperial power in Gaul since before the death of Gallienus, finding himself unable to wield it, surrendered it to Aurelian. By restoring good discipline in the army, order in domestic affairs, and political unity to the Roman dominions, A. merited the title awarded to him by the

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senate—'Restorer of the Roman Empire.' He fell a victim to conspiracy during his campaign against the Persians.

AURE'LIUS, MARCUS: see ANTONINUS.

AURELLE DE PALADINES, *ō-rĕl' dĕh pâ-lâ-dēn*, LOUIS JEAN BAPTISTE D': soldier: 1804, Jan. 9—1877, Dec. 17; b. Mabzieu, Lozère, France. Educated at St. Cyr milit. school, he entered the army 1824; served with distinction in Africa 1841–48; brig.gen. 1851. He earned high distinction at the Alma and at Inkermann in the Crimean war. He was promoted gen. of div. 1855; retired 1870, but on the outbreak of the war with Germany, was given command of the army of the Loire, which he thoroughly organized. 1870, Nov. 9, he defeated the Bavarian gen. Von der Tann at Coulmiers; but in Dec. suffered severe loss in a conflict with the army of Prince Friedrich Karl, of Prussia, and was removed from his command. He was chosen life senator 1876. He wrote: *Campagne de* 1870–1; and *La Première Armée de la Loire.*

AUREOLA, n. *aw-rē'o-la* [from L.L. adj. *aureolus*, dim. of L. *aureus*, golden]: in *Christian art*, a gold-colored or gilded background, representing an emanation of rays of glory, given to figures or symbols of the three persons of the divine trinity, of Jesus Christ, of the Madonna and Child, or of the Virgin alone, particularly when she is portrayed in her assumption into heaven. In form the A. is usually oval, and hence it is sometimes called *scutum* (shield) and *vesica piscis* (fish-bladder). The A. differs from the Nimbus (q.v.) in that the nimbus represents rays of glory emanating from and surrounding only the head of the subject, while A. is very commonly employed in both senses. In German, too, the words *Heiligenschein* (radiance of holiness) and *Glorie* are used indifferently to signify A. and nimbus. In the language of mediæval theol. the A. is a certain special enhancement of the essential glory of the elect in heaven, and is awarded to certain orders of the blest. Thomas Aquinas gives it to virgins, martyrs, doctors, and preachers: to virgins because of their triumph over the flesh, to martyrs for their triumph over the world; to doctors and preachers for their triumph over the devil.

AUREOLE, n. *aw'rē-ōl* [L.L. *aureola*]: an aureola (q.v.); a nimbus; a halo real or figurative.

AUREUS, n. *aw'rĕ-ŭs* [L., of gold]: anc. Roman gold coin first minted B.C. 207, with the same die as the denarius (q.v.), hence called *denarius aureus* (gold denar). The first aurei issued were of very fine gold, weighing $\frac{1}{40}$ lb., and each was equivalent to 25 silver denarii or 100 sesterces (q.v.). Under the commonwealth the A. was very seldom coined; under the emperors it was issued frequently, but its weight was steadily diminished: under Marcus Aurelius it weighed $\frac{1}{45}$ lb.; and under Caracalla $\frac{1}{50}$ lb. In Constantine's reign and afterward it was called solidus (q.v.).

AU REVOIR, *ō rē-vwŏr'* [F.]: till we meet again; good-bye.

AURI-ARGENTIFEROUS, a. *aw'rī-ăr-jĕnt-ĭf'ĕr-ŭs* [L. *aurum*, gold; *argentum*, silver; *fero*, bear, carry]: bearing or containing gold and silver.

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AURICHALCITE, n. *aw-rĭ-kăl'sīt* [L. *aurichalcum* or *orichalcum*—from Gr. *orcichalkos*, yellow copper ore—from *oros*, a mountain, *chalkos*, copper, bronze, brass]: a mineral placed by Dana under the fourth section of his Hydrous Carbonates. It occurs in acicular crystals, forming drusy incrustations; also columnar, plumose, granular, or laminated. Its lustre is pearly; its color pale green, or sometimes azure. The hardness is 2. A. is a basic carbonate of zinc and copper, formerly called brass ore because containing zinc and copper, though not brassy in appearance. The composition: oxide of copper, 16·03 to 32·5; oxide of zinc, 32·02 to 56·82; carbonic acid, 14·08 to 24·69; water, 9·93 to 10·80; lime, 0 to 8·62. It is found in England, Scotland, Spain, Asia, and America. Buratite, by some called *lime aurichalcite*, occurs in France and Austro-Hungary.

AURICLE, n. *aw'rĭ-kl* [L. *auric'u'a*, the ear-flap—from *auris*, an ear: F. *auricule*]: the outside ear; that cavity in the heart which receives the blood from the system or breathing organs, and pumps it into the ventricle—in the human heart the auricles being somewhat ear-shaped. See HEART. AURICLED, a. *aw'rĭ-kld*, having ear-shaped lateral appendages. AURICULAR, a. *aw-rĭk'ū-lĕr*, pertaining to the ear; told to the ear; secret. AURIC'ULARLY, ad. *-lĭ*. AURIC'ULAR CONFESSION, confession of sins made in the ear of the priest in the confessional with a view to absolution. AURIC'ULATE, a. *-lāt*, or AURIC'ULATED, a. shaped like the ear. AURIFORM, a. *aw'rĭ-fawrm* [L. *forma*, a shape]: in the shape of an ear. AU'RIST, n. one who treats diseases of the ear. AURISCOPE, n. *aw'rĭ-skōp* [Gr. *skopĕō*, I see or view]: an instrument which covers the auricle in order to ascertain by it the condition of the internal ear and its passage. AURICULO-VENTRICULAR ORIFICE, n. the orifice through which the blood passes from the auricle into the ventricle. It is guarded on either side by valves. AURICULA, n. *aw-rĭk'ū-lă*, a species of primrose called *bear's ear*, a native of Swiss Alps, ord. *Primulăcĕæ*.

Auricula (wild state).

AURICULA, *aw-rĭk'ū-la* (*Primula Auricula*): a plant of the same genus with the Primrose (q.v.), much cultivated in flower-gardens. It was highly esteemed by the Romans, and

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has, for nearly 200 years, received particular attention from the florists of England and Holland. Its cultivation is very successful in the little gardens of operatives near large towns. The A. has smooth, dark-green leaves, scapes (or leafless stems), and calyxes, covered with a mealy powder. A similar fine meal appears also on the flowers, and adds much to their beauty. The A. is a native of the Alps and other mountains of the middle and s. of Europe, and of sub-alpine situations in the same countries. It is found also on the Caucasus and the mountains of Syria; it grows in shady and moist places. In a wild state, it has comparatively small flowers, of a simple yellow color, on short stalks, forming an umbel of generally six or seven on one scape, with the same delightful fragrance which it has in cultivation. The leaves are used by the inhabitants of the Alps as a remedy for coughs.

By cultivation and art, the A. has been brought to great splendor of color. Red, pink, crimson, apple-green, and mulberry are the chief colors of the different varieties. More than 1200 varieties have been reckoned, and new ones are continually appearing, some entirely of one color, others of two or more; some delicately shaded, some variegated. The mere color of an A. is not of so much consequence, in the eye of a florist, as the form and shading. The chief requisites of a good A. are large flowers, so many of them on one scape as to give fulness to the umbel, the flower-stalks so strong that the flowers do not hang down; the scape itself must be so tall that the umbel of flowers may rise completely above the leaves, and so strong as to bear it erect; the flower must be nearly round; the white or yellow eye in its centre must be distinct and round, its color not mixing with the ground color, which, however, may mix at the outer part with the green of the margin. The green margin adds much to the beauty of many varieties. The mealiness of the flower differs much in different varieties.—The A. blooms in April and May, and often a second time in the end of autumn. It thrives in a rich light soil, and cultivators diligently prepare for it composts of various kinds, in general chiefly of fresh loamy soil, and of well-rotted horse or cow dung, often with a little sand. The finer varieties are always cultivated in pots, and require great attention. They are protected from the severe weather of winter, and during the flowering season from wind and rain. They ought, however, previous to flowering, to stand in an airy, sunny situation. They are propagated by offsets, generally in the latter part of August.—When it is proposed to raise the A. from seed, care ought to be taken to select the finest flowers, which are encouraged to ripen their seeds by exposure to sun and air, hand-glasses being placed over them during heavy rains. The seed is sown either in autumn or spring, generally in boxes placed under shelter, or in a slight hot-bed. The more weakly plants are tended with particular care, as they are generally found to produce the finest flowers.

The name A., originally Latin, is derived from *auris*, an ear, on account of a fancied resemblance of the leaves to the ears of an animal.

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AURIC'ULA: a genus—and AURICU'LIDÆ: a family—of Gastropod Mollusca. They have a spiral shell, covered with a horny epidermis, the first whirl very large and the spire short, the aperture elongated and toothed. They belong to that section of Gastropods in which the sexes are united in the individual, and to the same order with

Auricula.

the common snails, having respiratory organs adapted for breathing in air, though some of them are capable of subsisting for a considerable time in water. Some of them inhabit fresh-water marshes, others prefer the vicinity of salt water. They generally belong to warm climates, and some of them attain a large size. *Auricula Midæ*, a native of the East Indies, is known to shell-collectors by the name of Midas's Ear.

AURIC'ULAR CONFESSION: see CONFESSION.

AURIC'ULATE, in Botany: a term applied to leaves, stipules, etc.; signifying that they have at the base two small ear-like lobes.

AURIFEROUS, a. *aw-rĭf'ĕr-ŭs* [L. *aurum*, gold; *fĕro*, I produce]: yielding or producing gold.

AURIGA, n. *aw-rī'ga* [Sp. and L. *auriga*, a wagoner—from *aurea*, a bridle; *ago*, I drive, I manage]: one of the ancient northern constellations, the Wagoner; in *anat.*, the fourth lobe of the liver; in *surgery*, a bandage for the sides.

AURIGRAPHY, n. *aw-rĭg'ra-fĭ* [L. *aurum*, gold; Gr. *grapho*, I write]: the act or process of writing with gold instead of ink.

AURILLAC, *ō-rē-yăk'*: t. of France, cap. of the dept. of Cantal (Auvergne); in a pleasant valley on the banks of the Jourdanne, about 269 m. s. from Paris. It is said to owe its origin to a Benedictine monastery founded in the 9th c. by St. Gerard. The English, in the 14th and 15th centuries, often besieged the town, and it was frequently taken and pillaged during the religious wars in France in the 16th c. The streets are wide but irregular, and are kept clean by streams supplied by a reservoir above the town and by a canal from the Jourdanne. The neighboring quarries supply slates to cover the houses. The principal buildings of A. are the churches of Notre Dame and St. Gerard, St. Stephen's Castle, the theatre, college buildings, which contain a valuable public library, and the corn-market. Paper, jewelry, lace, copper

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utensils, leather, and beer are the chief industrial products. Pop. (1891) 15,824.

AURIN, n. *aw'rĭn* [L. *aurum*, gold]: a substance of a golden-red color obtained from carbolic acid; one of the aniline dyes, known also as 'rosolic acid' or 'coralline yellow.'

AURIUM, n. *aw'rĭ-ŭm* [L. gen. pl. of *auris*, an ear]: in *med.*, *aurium tinnitus*, tingling of the ears, i.e., in the ears.

AUROCHS, n. plu. *aw'rĭks* [Ger. *aurochs* and *auerochs;* L. *urus;* Gr. *ouros*, a wild bull]: the bison or wild ox of Poland.

AURORA, n. *aw-rō'rŭ* [L. *Aurōra*, the goddess of the morning]: the rising light of the morning; the plant crowfoot. AURO'RAL, a. belonging to the morning. AURO'RA BOREALIS, n. *bŏr'ē-ā'lĭs*, shooting lights of varied colors seen in the northern parts of the heavens, generally called the northern lights. AURORA AUSTRALIS, n. *-aws-trā'lĭs*, the southern lights.

AURORA, *aw-rō'ra:* city in Kane co., Ill.; on the Fox river, and the Chicago and Iowa, and Chicago Burlington and Quincy railroads; 38 m. from Chicago. It has a capable fire department, provided with steam fire-engines and Holly water-works, a fine city hall, iron bridges, a handsome hall used for a public library, Young Men's Christian Association building, etc. The city is lighted by electricity. There are two national banks and a number of important manufacturing establishments which obtain power from the Fox river. There are here railroad repair shops; these, belonging to the Chicago Burlington and Quincy railroad, employing about one thousand men. A. has excellent public schools; also the Jennings Seminary, which is of high repute. Pop. (1870) 11,162; (1880) 11,873; (1890) 19,688.

AURORA: city in Dearborn co., Ind.; on the Ohio river; 25 m. below Cincinnati, on the Louisville branch of the Ohio and Mississippi railroad. It has a large trade in hay, a number of manufactories, a high school, one national bank, and publishes three weekly papers. Its river trade is large and growing rapidly. Pop. (1870) 3,304; (1880) 4,434; (1890) 3,929.

AURO'RA (styled *Eōs* by the Greeks): the goddess of the dawn, or 'morning redness;' dau. of Hyperion and Theia, sister of Helios and Selene, wife of the Titan Astræus. Zephyrus, Boreas, Notus, Hesperus, and the other stars were her children. She was described as rising in the morning from her bed in the ocean, borne along on a chariot drawn by the divine steeds Lampus and Phaëton, ascending heaven from the river Oceanus, where she lifted with her 'rosy fingers' the curtain of night, and announced the light both to gods and men. Homer frequently describes A. as the goddess of day, and the tragic writers identified A. with *Hemera* (the day). She was represented as clothed in a rosy-yellow robe, with a star

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shining on her forehead, and a torch in her right hand. She had a passion for mortal youths, and carried off Orion, Cleitus, and Tithonus.

AURORA BOREALIS, *aw-rō'ra bŏr'ē-ā'lis*, or NORTHERN LIGHTS (Ger. *Nordlicht*): the luminous phenomenon seen towards the north of the heavens by the inhabitants of the higher latitudes. During the winter of the n. hemisphere, the inhabitants of the arctic zone are without the light of the sun for months together, and their long dreary night is relieved by the light of this beautiful meteor, frequent in those regions. Those who have explored the southern seas have seen the same phenomenon in the direction of the south pole, so that the term Polar Lights might be more appropriate than Northern Lights to designate the aurora. The appearance of the Aurora Borealis has been described by a great variety of observers, both in northern and central Europe, all substantially to the same effect. A dingy aspect of the sky in the direction of the north is generally the precursor of the Aurora Borealis;

Aurora Borealis.

this gradually becomes darker in color, and assumes the form of a circular segment surrounded by a luminous arch, and resting at each end on the horizon. This *dark segment*, as it is called, has the appearance of a thick cloud, and is frequently seen as such in the fading twilight before the development of the auroral light. Its density must, however, be very small, as stars are sometimes seen shining brightly through it. This dark segment is bounded by a luminous *arch* of a bluish-white color, which varies in breadth from 1 to 6 diameters of the moon, having the lower edge sharply defined, and the upper edge only when the breadth of the arch is small. This arch may be con-

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sidered to be a part of a luminous ring elevated at a considerable distance above the earth's surface, and having its centre corresponding with some point near the n. pole. An observer several degrees s. of this auroral ring would see towards the n. only a small arc of it, the larger part being hid by the earth; to one situated not so far s. it would appear as a larger and higher arch; to one placed below it, it would be seen as an arch passing through the zenith; and to one within the ring and further n. it would be found as an arch culminating in the s. On this supposition, nearly all the various positions of the auroral arch may be accounted for. The centre of the ring corresponds probably with the magnetic north, which is at present situated in the island of Boothia Felix. Hence it is that in Greenland, to the east of this island, the auroral arch has been seen stretching from n. to s. with its highest point in the w. The luminous arch, once formed, remains visible for several hours, and is in a constant state of motion. It rises and falls, extends towards the e. and towards the w., and breaks sometimes in one part, sometimes in another. These motions become all the more observable when the arch is about to shoot forth *rays;* then it becomes luminous at one point, eats in upon the dark segment, and a ray of similar brightness to the arch mounts with the rapidity of lightning towards the zenith. The ray seldom keeps the same form for any length of time; but undergoes continual changes, moving e. and w., and fluttering like a ribbon agitated by the wind. After some time, it gradually fades in brightness, and at last gives way to other rays. When the aurora attains its full brightness and activity, rays are projected from every part of the arch, and if they do not rise too high, it presents the appearance of a comb furnished with teeth. When the rays are very bright, they sometimes assume a green, sometimes a violet, a purple, or a rose color, giving to the whole a variegated and brilliant effect. The accompanying sketch, taken from Müller's *Kosmische Physik,* of the Aurora Borealis in Norway, represents a beautiful aurora of this comb-shaped character. When the rays darted by the luminous arch are numerous and of great length, they culminate in a point which is situated in the prolongation of the dipping-needle, somewhat s.e. of the zenith. There they form what is called the *Boreal Crown;* and the whole heavens, towards the e., w., and n., present the appearance of a vast cupola of fire, supported by columns of variously colored light. When the rays are darted less brilliantly, the crown first disappears, then, here and there, the light becomes faint and intermittent, till at last the whole phenomenon fades from the sky.

The preceding description indicates the general features of the appearance of the Aurora Borealis; but several auroras have been described which presented striking peculiarities. Sometimes the phenomenon assumed the form of one or more curtains of light, depending from dingy clouds, whose folds were agitated to and fro, as if by the wind. Sometimes this curtain seemed to consist of

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separate ribbons of light, arranged side by side in groups of different lengths, and attaining their greatest brilliancy at the lower edges.

The height of the aurora has been variously estimated. The first observers were inclined to place the seat of it beyond the atmosphere; but this hypothesis is untenable, as the aurora does not seem to be affected by the rotation of the earth, but appears to be in every respect a terrestrial phenomenon. By taking observations of the altitude of the highest point of the arch of the same aurora at different stations, heights varying from 5 to 500 m. have been calculated. The cause of these widely differing results may be found in the probability that exists of each observer seeing a different arch of the aurora for himself, and he is, in consequence, furnished with no comparable or reliable data for his calculations. It is now, however, generally admitted, on what are considered sufficient grounds, that the Aurora Borealis occurs at various heights, and that it is seldom found beyond 90 m. above the surface of the earth. The distance of the stations at which the same aurora has been visible indicates the enormous geographical extent, and likewise the great altitude, which the phenomenon frequently attains. One aurora, for instance—that which occurred 1839, Sept. 3, was seen in the Isle of Skye by M. de Saussure; at Paris, by the astronomers of the Observatory; at Asti, in northern Italy, by M. Quetelet; at New Haven, Conn., by Mr. Herrick; and at New Orleans by credible observers. On the other hand, some observers of eminence assert that the aurora sometimes descends to the region of the clouds, and appears almost as a local phenomenon. Boscovich estimated the height at 825 m.; other observers have named a few hundred feet. Dr. Sophus Tromholt, who carried out a series of investigations on the subject of the Aurora Borealis in the extreme n. of Norway, affirms (in his book *Under the Rays of the Aurora Borealis*, 1885) that the height of those observed by him ranged from 62 to 124 m. It seems to be entirely untrue that the light of the aurora is ever serviceable to people in their work; its contribution to lighten the darkness is almost nil; the momentary flashes of real luminosity are very brief and of no practical value.

The noise that is alleged to accompany the Aurora Borealis in high latitudes would indicate for it a comparatively moderate height. Some of those who have heard it compare it to the noise produced by the rolling of one piece of silk upon another; and others to the sound of the wind blowing against the flame of a candle. In Siberia, it has been related that this noise sometimes resembles that attending the discharge of fireworks; and that the dogs of the hunters, when overtaken by such an aurora, lay themselves with terror on the ground.*

The intimate connection between the Aurora Borealis

* Arctic voyagers, such as Parry and Franklin, throw doubt on the existence of any such noise, for not one of the numerous and brilliant auroras seen by them was ever attended with the faintest sound.

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and the magnetism of the earth is shown by various facts. During the occurrence of the phenomenon the magnetic needle appears very much disturbed, sometimes deviating several degrees from its normal position, and appearing to be most affected when the aurora is brightest; and this oscillation is frequently perceived far beyond the district where the aurora is seen. The vertex, likewise, of the luminous arch is almost always found to be in or very near the magnetic meridian, and the boreal crown has its seat in the prolongation of the freely suspended needle. There seems, moreover, to be a connection between the magnetic poles of the earth in regard to the aurora, for, so far as has been ascertained, the meteor occurs simultaneously at both. The Aurora Borealis appears to be an electric discharge connected with magnetic disturbance. If one of Gassiot's vacuous tubes is brought near an electric machine, or between the poles of an induction coil, flashes of light pass between the ends, which bear a striking resemblance to the Aurora Borealis. A comparison of the spectra of the two goes far to establish identity. The auroral spectral line, according to Angström, is a yellow line near the sodium line, and is the same as the air line seen in the solar light when the sun is near the horizon. Other lines, however, have been seen, which cannot as yet be produced by the physicist from any known substance.

A line drawn through the s. of Spain to the n. of the Sandwich Islands, and through Cuba, approximately marks the s. limit of the Aurora Borealis (in the northern hemisphere); though occasional displays have been noticed further south. To the n. of a line passing through Edinburgh, the frequency of the Aurora Borealis rapidly increases, until a maximum is reached in a line through the n. of Spitzbergen, after which the frequency diminishes as the North Pole is approached.

AUROTELLURITE, n. *aw-rō-tĕl-lū'rīt* [L. *aurum*, gold; mod. L. *tellurium*, the metal so called: Gr. *líthos*, a stone]: a mineral, the same as Sylvanite.

AURUM: see GOLD.

AURUNGABAD, *ō-rŭn'ga-bád'*, or *Throne-town:* town in the territory of the Nizam; on the Doodna, a tributary of the Godavery. Its monuments of former grandeur are a palace, now in ruins, built by Aurungzebe, and the mausoleum of Aurungzebe's daughter. Pop. est. 60,000.

Other places in India are named Arungabad.

AURUNGZEBE, *ō-rŭng-zāb'* (properly, Aurangzîb, 'Ornament of the Throne'): most powerful of the Great Moguls, the last who ruled with energy and effect: 1618, Oct. 22—1707, Feb. 21. He was ten years old, when his grandfather died, and his father, Shah-Jehan, ascended the throne. A. early aspired to wield the rod of empire, but he craftily hid his designs beneath the cloak of piety. In 1657, his father, who had previously promoted him to high civil and military offices in the state, in which A. distinguished himself, was seized with an illness from which he was not expected to recover. The reins of power

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were at once seized by his eldest son, Dára, who treated his brothers very arbitrarily—Shujá at that time being governor of Bengal, A. of the Deccan, and Múrad of Guzerat. The first immediately took up arms. A.'s policy was to let the two fight it out, and exhaust each other, and then to play off his third brother against the victor. He conferred with Múrad; assured him he had no earthly ambition; that the crown he strove for was a spiritual, not a temporal one; and that, for affection's sake, and with a view to promote the interests of the true faith (Dára was liberal in his religious opinions, and had written a book to prove that Mohammed and Brahma agreed in all essential points) he would support his pretensions to the throne. Múrad believed him, and the forces of the two were joined. Meanwhile, Dára having overcome Shujá's army, directed his forces against his other two brothers; but A.'s plausibility prevailed over Dára's generals, who deserted, and Dára had to seek safety in flight. By this time, however, Shah-Jehan had somewhat recovered. A. professed the utmost loyalty, but secretly gave his son

Aurungzebe.—From a Native Drawing.

structions to take possession of Shah-Jehan's palace, which was done, and the aged monarch was made prisoner. A next seized and confined his too confiding brother, Múrad; and after a struggle of two or three years' duration, Dára and Shujá also fell into his power, and all three were put to death. The sceptre was now firmly within the grasp of Aurungzebe. He professed not to care for the imperial insignia, but was ultimately induced to receive them, 1678, Aug. 2. He, at the same time, assumed the presumptuous title of Alemgír, 'Conqueror of the World.' He also took the title of Mohi-eddín, 'the Reviver of Religion.' In the seventh year of A.'s reign, his father died, at a good old age; but there are suspicions, nevertheless, that his death was hastened by slow poison, administered by command of his son.

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A.'s long reign of half a century was distinguished by great outward prosperity; but the empire was diseased at its heart. Everywhere there was distrust; A., who had established his empire by fraud, was naturally distrusted by all. He lacked confidence in his statesmen, who, in their turn, distrusted him and one another. His sons imitated him in his disobedience to his father, and the Hindus, whom he treated with great harshness, excited the Mahrattas against him in the south. Still his great abilities sufficed during his reign not only to preserve his empire, but even to enlarge it. Discord between the monarchs of Bijapur and Golconda, due mainly to his policy when acting as governor of the Deccan, enabled him to add these two kingdoms to his empire. But the seeds of decay sown in his reign bore ample fruit in the reign of his son. The decadence of the Mogul empire dates from A.'s death, at Ahmednuggur, in the 89th year of his age, and 50th of his reign. The latter years of A.'s life were passed in misery. The memory of his own crimes weighed heavy on his soul. He lived in constant dread that he himself would receive of the measure which he had meted out to others. His court was remarkable among oriental courts for its economy and freedom from ostentation. A.'s character was not without its good features, as instanced by the fact that in the third year of his reign, when there was a great famine in the land, he gave unreservedly the funds of his treasury, which had been greatly augmented by his frugality, to procure food for his people.

AUSABLE, *aw-sā'bl:* city of Iosco co., Mich., on the Detroit Bay City and Alpena railroad; 50 m. from Bay City. Principal industries: lumbering, salt-making, and fishing. There are two state banks, one with capital $25,000, the other $50,000, $3,500 surplus, and $8,500 undivided profits. Two weekly newspapers are published. Pop. (1890) 4,328.

AUSCULTATION, n. *aws'kŭl-tā'shŭn* [F. *auscultation*—from L. *auscultātiōnem*, a listening with attention—from L. *ausic'ula*, old form of *auric'ula*, dim. of *auris*, an ear]: mode of detecting diseases, especially of the heart and lungs, by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (*Immediate* A.). or by the aid of a simple sound-conveying instrument, the stethoscope (q.v.) (*Mediate* A.). By care and attention, the normal sounds produced by respiration and the beating of the heart may be distinguished from the several abnormal sounds indicating disease. A. is among the most important discoveries in modern medical science (see PERCUSSION). AUSCULTATORY, a. *aws-kŭl'tă-tĕr'ĭ*, pertaining to hearing. AUS'CULTA'TOR, n. one who listens.

AUSONIA, n. *aw-sō'nĭ-a* [L. *Ausonia*—from *Ausones*, the inhabitants of *Ausona*, a town in Latium]: an ancient name of Italy; in *astron.*, an asteroid, the 63d found. It was discovered by De Gasparis, 1861, Feb. 11.

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